# WORK

## An Illustrated Magazine of Practice and Theory

FOR ALL WORKMEN, PROFESSIONAL AND AMATEUR.


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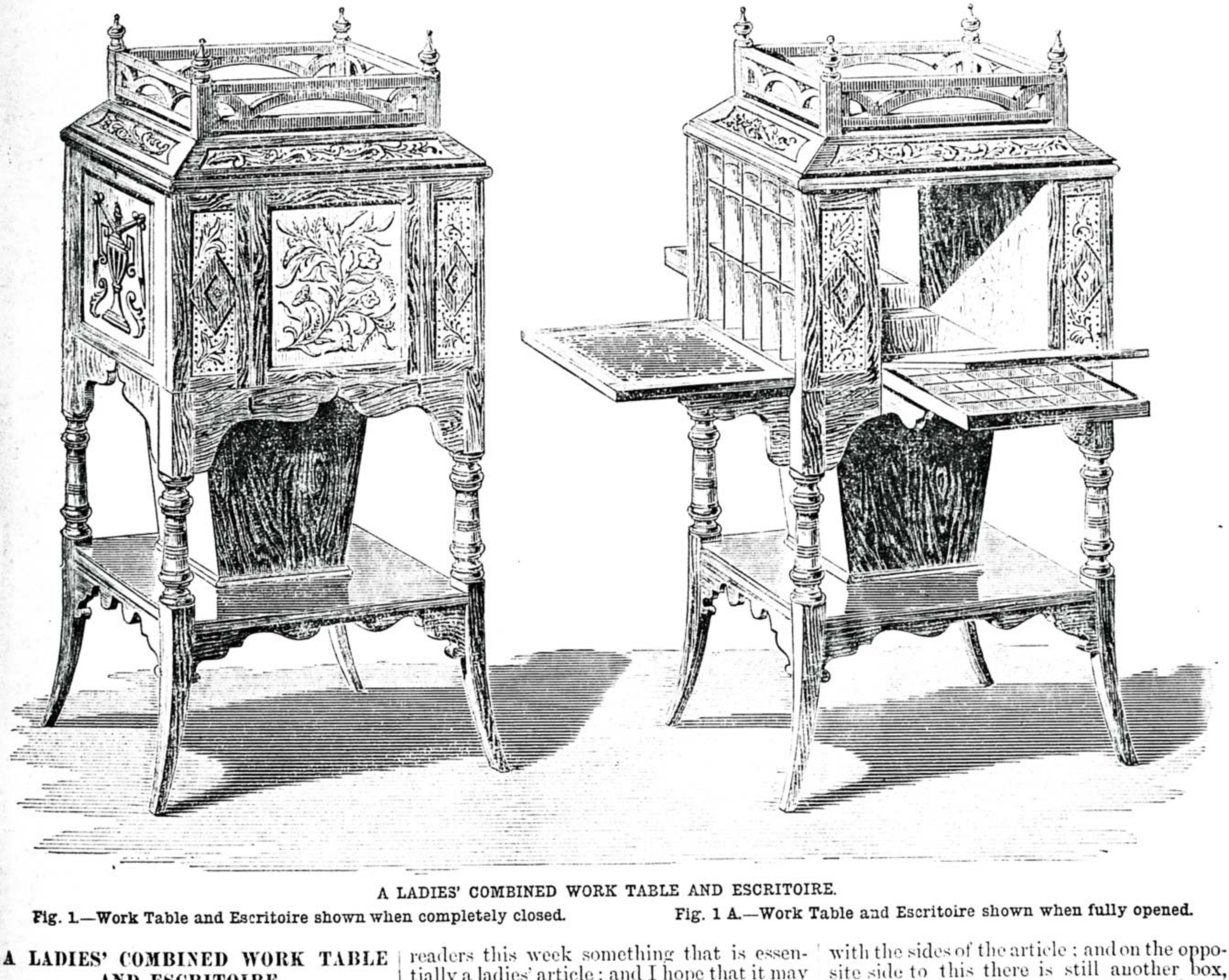

A LADIES' COMBINED WORK TABLE AND ESCRITOIRE.

Fig. 1.—Work Table and Escritoire shown when completely closed.

Fig. 1 A.—Work Table and Escritoire shown when fully opened.

## A LADIES' COMBINED WORK TABLE AND ESCRITOIRE.

BY JAS. SCOTT.

[*For other Diagrams and Working Drawings illustrative of this Paper, see page* 53.]

WE must not forget the ladies in WORK. Although it cannot be called, and is not meant to be, a ladies' journal, I daresay there are very few among its readers who are not possessed of either a wife, sister, or sweetheart; and I know that young ladies generally, if they may think some of the periodicals their male relatives are in the habit of reading are rather too dry for *them*, always have a wish—which they seldom let remain unsatisfied—to look over the illustrations, and pass their opinions upon them.

It is with this in view that I give to my readers this week something that is essentially a ladies' article; and I hope that it may find favour in the eyes of some fair—or, for the matter of that, dark—lady, who will successfully persuade her husband, brother, or betrothed, as the case may be, to make one for her; and what man is there who would not make, when it lay in his power, at least one heart happy?

This article has what designers generally term a "busy" look about it; but there is not very much work in it, considering the several uses to which it may be put. On one side we have a door that forms a writing-flap, and pigeon-holes for stationery; on the opposite side there are twelve small drawers, which will be found very handy for keeping small articles in; on another side is a box which is intended as a receptacle for reels of cotton, and which shuts up flush with the sides of the article; and on the opposite side to this there is still another box, which is divided into compartments, as shown in Fig. 5. In the centre there is a well to hold loose pieces of needlework, etc. The top, being flat, affords a nice place for the display of a vase of flowers or a globe of fish; and if the lady's skill is also brought into the work, a pretty and useful article should be the result.

Those among the beginners who have a knowledge of joinery sufficient to enable them to put together small articles, but who do not feel confident enough to try their hand at such a job as is here shown, should read the excellent articles given in various numbers of Vol. I. by Mr. Adamson.

In dealing with the making, we will take the top part first. Fig. 3 shows how the middle board must be cut to allow the

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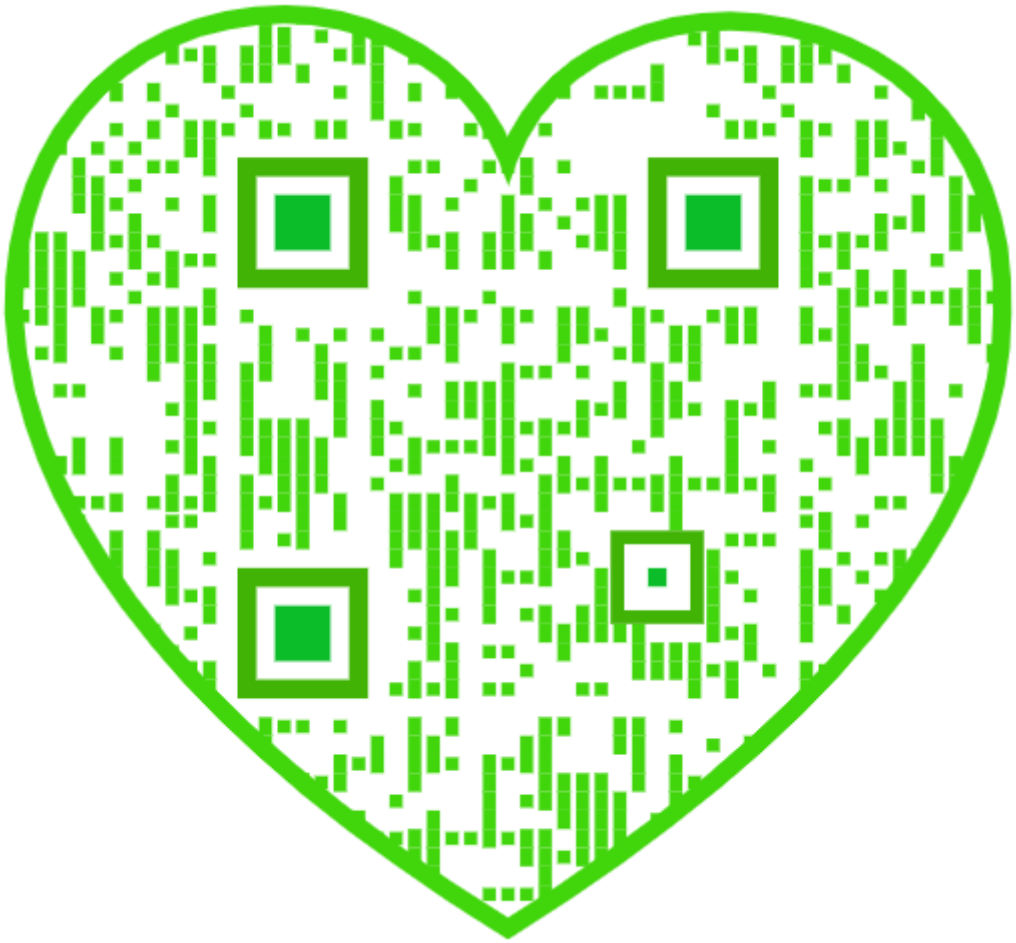

movable brackets to fit in; and it will be noticed that the two which support the writing-flap are hinged to the leg block; while those that support each of the two side boxes are cut in half; one half being fitted under the middle board and against the leg block, and the other half being hinged to it. On the side of the drawers there is no need to cut any away; but on the opposite side, where the writing-flap comes, it will be necessary to cut it away the whole length. From each of the other two sides a piece 12 in. in length must be taken off.

The blocks of the four turned columns that fit into the corners are each 1½ in. square in thickness. In the centre is a space 12 in. square. The two large brackets are each 10 in. long, and the four smaller ones 6 in.

Fig. 2 gives the plan of the top carcase. The two boards forming respectively the back of the drawers and pigeon-holes will each be 23 in. long and 15 in. high. The four ends to be attached to these backboards will each be the same height, and 5½ in. wide. In Fig. 7 we have the half-elevation of the pigeon-holes for stationery. Each of them will be about 4 in. wide: the top holes will be 2½ in. deep, those in the middle 5½ in. deep, and the bottom ones 6½ in. The partitions dividing them would be substantial enough if made of ¼ in. wood; and they should not come flush with the front, as ½ in. space must be allowed for the writing-flap. On the opposite side the drawers will, of course, come flush with the front, and the partitions dividing them might be either ⅜ in. or ½ in. thick. The top drawers will be 2¼ in. deep—if the divisions are ½ in. thick; the second row 2½ in.; the third row 3¾ in.; and the bottom row 4 in. Some, however, may prefer them all one size; and it will not be a difficult matter to reckon the size of each, if so. They may be fitted with knobs or brass handles; knobs are preferable if made in light wood, brass handles if made in dark wood. Each one might have a small lock, one key fitting them all.

The top board should be a trifle more than 23 in. square, and should be rounded on the edges.

The board to which the top fretwork framing is attached should be 18 in. square. The four side-pieces should each be 23 in. long on their bottom edge, and 18 in. long on their top edge. They may be any width, the top, of course, being raised or lowered according to the width. The four corner posts should each be about 3½ in. high, and should be surmounted by turned ornaments. The fretwork may be of any pattern.

We now come to the reel box and its opposite companion. The reel box will be 12 in. wide, 15 in. long, and 2½ in. deep. These measurements include the lid. The size of the compartments is quite optional. Two small fastenings should be fitted to it: one to secure the lid, the other to secure the box when flush with the side. Fig. 4 shows the elevation of it. The box on the other side (Fig. 5) might be the same size exactly, and similarly fitted as regards fastenings.

Unless these two boxes are made to fit rather loosely, it will be advisable to make the front, which comes in contact with the top board, either on the cant, as in Fig. 12, or rounded, as in Fig. 13, as the boxes will then work in and out the easier. If the maker wishes to do away with the fastenings on the lids of these boxes, he had better fix a strip of wood across each side of the large opening, so that when they are in a perpendicular position the lids will not fall down inwards.

The writing-flap will be 22 in. long and 15 in. wide. This, and the two boxes, should be secured by means of a pivot at each end, which is driven into them and through the side pieces. If, however, the maker would prefer hinges, he *must not cut the board* (Fig. 3) *at the edges*, as I have shown. They should then come flush with the pillar blocks, and thus can receive the hinges. In this case the brackets should be the same make and shape, and should be fastened *under* the middle board: it will then be found that the two boxes and writing-flap will be on the slope when resting upon them, instead of quite horizontal, as I show them. This may be an advantage in the case of the writing-flap, and, perhaps, may be preferred on account of its allowing the introduction of a moulding round the edge of the middle board, which can scarcely be placed round it if the flap, etc., work upon pivots.

The bottom of the well will be 9 in. square; the top, 12 in.

The height from the floor to the top of the pillars will be 28 in. According to the depth of the well so will the length of each foot be. These feet spread out from each corner. The most convenient depth for the well will be 16 in., and whatever the depth agreed upon, the size of each of the four or five boards composing it can easily be ascertained. I say four or five, because, if joined into the bottom board, only four will be required; whereas, if made as a separate box, it will require five boards. If the depth I have given is decided upon, each of the four sides will be 17½ in. long, 13 in. wide on top, and 10 in. wide at the bottom. A narrow moulding should be glued round the bottom of it, to add a finish to it, and to hide where it joins the bottom board.

The four shaped pieces between the feet need little commenting upon. It is surprising what a pretty effect such pieces produce upon any article of furniture in which they are properly introduced.

Fig. 8 shows the shape of each of the four small brackets, if it is intended for the boxes to work upon pivots. The larger portion of it should be secured to the pillar block and the under side of the middle board, while the smaller portion is hinged to it. In my measurements I have allowed sufficient for joinery. The large top, middle, and bottom boards might each be ⅝ or ¾ in. thick, and the remainder of the carcase ½ in. thick.

I should not advise castors to be fastened to the feet, as in that case it would be rather unsteady when used as a writing-table. The writing-flap is certainly not very large, but certainly the average young lady would prefer it to be small.

For the ink-bottle and pen-rack there is plenty of room, or spaces could be purposely made for them.

I said at the beginning of this article that a pretty job might be made by the addition of the skill of the young lady for whom it is intended. The reel spaces might be lined with silk, satin, or plush, and the compartments shown in Fig. 5 might be treated in a similar manner. Then a few pieces of satin, silk, or ivorine might be painted upon, and secured to the top and sides by means of plush-headed or brass-headed studs. The lining of the writing-flap could also be performed by the lady. The front of the flap as well might have a few flowers painted upon it, and a few gilt lines round it; so also could the fronts of the boxes.

Then, again, if she is fond of colour, she might use some pretty enamel to paint the whole article in; but some judgment must be used in selecting the colour or colours, as the job would, in my opinion, be less effective if in any very dark colour; whereas, the light and shade to be obtained by the use of a light and not too glaring enamel might produce a pretty effect. It will generally be found that articles that have much curved shaping about them look well in dark colours, by reason of the light reflected upon the prominent parts; but that in things that have a square appearance, if made in a light wood or painted in a light colour, the shadows that are thus cast effect a happy contrast; and although it seems paradoxical, a happy contrast is a happy harmony.

## THE MECHANICAL PROCESSES OF SCULPTURE.

BY MARK MALLETT.

### Modelling.

MODELLING IN CLAY—THE MATERIAL AND ITS COST—PREPARATION—KEEPING IT IN ORDER—HOW TO TREAT IT WHEN THE MODEL IS MOULDED—CARE OF CLAY WHILST IN THE MODEL.

IT may be said of modelling that it is the exact reverse of carving. The carver cuts down to his form, and perfects it by clearing away all superfluous material; the modeller, on the other hand, builds up to his form, and perfects it by adding material wherever required. And this essential difference it is well for the young modeller to bear in mind, for the beginner, especially if in any way used to handling the chisel, will feel tempted to use his tools in cutting his material into form rather than to use his thumbs in building it gradually up. This temptation will have to be resisted.

Various materials have been used for modelling, but of these the most important, and the one with which we have to deal at present, is clay. The best clay for the purpose is generally considered to be Devonshire pipe-clay. This certainly has all the qualities that a reasonable modeller can desire. It is—what is of the first importance—highly plastic, yielding readily to the touch; its cool grey colour is pleasant to the eyes; it is cleanly; and it is in most places to be procured readily and cheaply. Any tolerably pure clay will, however, serve the modeller's purpose, and some workers prefer clay which, owing to the presence of iron, has a warm brown tone. This is merely a matter of taste.

As dug from the pit, no clay is fit for use. It needs to be tempered and prepared. If the modeller buys his clay in the rough, his ordinary plan is to lay it on a strong table or bench, and thoroughly beat it with an iron bar, picking out as he does so all stones and other foreign matters. Some persons sift a little fine sand into the clay during beating to make it work more freely, and if the modelling is to be on a large scale, this is an improvement.

On the wharves of most of our large towns clay is to be bought in the rough at, say, thirty shillings or forty shillings per ton; but most modellers buy it ready prepared. In this state it is to be bought at potteries, pipe-makers', and plaster figure moulders' by the pound; a penny a pound is often charged for it, but by the hundredweight the price is much lower.

For use, the clay should be so soft as to be easily moulded into any shape and spread out smoothly by the thumb, but it should not be so soft as to be sticky. If clay is too soft, exposure to the air will

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soon dry and harden it sufficiently; if any lump should be a trifle too hard, two or three holes may be punched in it with the finger and filled with water, and a wet cloth wrapped round it. This will soften it in a few hours; but if clay should be found much too hard, the better plan is to break it up in small pieces, soak it for a time in water, and then beat it up again as at first. Not otherwise will it be brought to that regular consistency of softness throughout which is essential to proper modelling.

That it may always be ready for use, some arrangement is necessary for keeping the clay moist. If the modeller works on a large scale, he will do well to have a bin made of stout boards, lined with zinc soldered together at the corners, and having a tightly-fitting lid. For work on a smaller scale, a glazed earthen pan with a lid answers the purpose admirably. A pan known as a "bread pan," capable of holding enough clay for a bust, is sold at earthenware shops for about two shillings. If the lid fits well, a very little water in the bottom of the bin or pan will keep the clay in proper working order for months.

Should clay be allowed to become perfectly dry, it can be soaked again with water, but it will then crumble down to a kind of mud, which will seem for the time to have lost its cohesive properties. It will need drying to some extent, and after that quite as much beating and tempering as at first. It is, therefore, better not to let clay get quite dry, if it can conveniently be kept moist.

In my preliminary sketch I mentioned that when the plaster mould had been taken, the original clay model was dug from it and thrown aside; but by this it was not intended to imply that the clay forming that model was of no further value. Clay is not only none the worse, but decidedly the better, for having been used. The tempering it receives in use makes it work more smoothly and freely than new clay. When dug from the mould, however, it will not be fit for immediate use: it will be too hard. The best way of treating it is at once to break it up into pieces of, say, the size of walnuts, and put water to it. After due time for soaking, it will need beating up again, but it will want less tempering and work better than if it had been allowed to get quite dry; and as in the process of casting more or less lumps and chips of plaster are sure to have found their way into it, these should be carefully picked out. And at this point I would wish to impress upon the young modeller the necessity for always having his clay thoroughly beaten and tempered; if it has in it hard lumps and is not of a regular consistency, it will not be possible for him to work smoothly, rapidly, or pleasantly.

Some readers of these papers, desirous of obtaining an insight into the actual process of modelling, may, perhaps, consider that the mere management of clay is being dwelt upon to a tedious extent. It is, however, necessary that this information should be given; and for convenience of reference it is better that it should be given altogether in a preliminary chapter like the present. Such readers can, if they like, pass on to the next chapter, and turn back to this by-and-bye, when they find a need for the information contained in it; for before closing it we shall have to follow the same subject still farther.

Something must be said with regard to the management of clay in the actual model. The necessity for keeping it wet has already been spoken of. At the first building up the clay model does indeed rather need drying than damping, and has to be left uncovered for a space in order that it may set. But after this, which takes but a few hours, more or less, according to the size of the model, wet cloths have to be kept over it, except during the time that the modeller is at work; and should this be for long together, a moistening now and then will be desirable. For throwing water over a model, some sculptors use a syringe having a rose pierced with minute holes. This is necessary for works of very large size; but for busts and works on a less ambitious scale, this sprinkling can best be done with the instrument of Nature's providing: namely, the mouth. Nothing blows a cloud of spray so fine as to thoroughly moisten all the surface without running off in streams as the mouth. The plan is to fill the mouth with water, and blow it out through a small opening at the middle of the lips; the knack of doing this is easily acquired. The uncleanliness of the practice—if it be uncleanly—is a thing that one soon ceases to notice.

Before the modeller leaves his work he wraps it in wet cloths. In the earlier stages it matters little what these cloths may be, or how they are put on; but as the work progresses he puts tolerably fine calico nearest to the clay, keeping his thick coarse hempen wraps outside. As more delicate work is put in, and the surface receives greater finish, he does not care to have his model touched by any cloth whatever. His ordinary plan for its protection is to stick wooden skewers into those parts where there is no delicate modelling to be injured. By these the cloth is kept away from the clay: spots are always to be found where the skewers will do no harm; and the holes made by them are easily stopped before casting.

Sometimes, instead of skewers, a regular frame of wooden spars or of wire is made to fit over the model, and if the work has to be kept in the clay for a long time, this plan has its advantages; but wood is better for such a frame than metal, for when exposed, as it must be, to constant damp, iron wire rusts and iron-moulds the cloths, and copper grows green and poisonous. For busts and the like, a large frame covered with oil-cloth to fit over the inner wrappings is an excellent thing, and thus protected, the model may be kept in good working order for months, and even for years.

There is another way in which models in relief may be kept damp, and that is by working them on a background of plaster; but this is only applicable to medallions and other small matters which are but little raised from the background. The highly porous nature of plaster enables it to take up a great deal of water, and of this the clay will suck enough to keep it sufficiently moist for a reasonable time without wet wraps.

A minor point in connection with the keeping of clay in models is that of avoiding fungoid growths. To this end it is well that wherever wooden supports are used in the clay they should be of the pine or deal kinds. These resinous woods do not encourage the growth of fungus as do elm and most other timbers, and such growths in one's model are, to say the least, disagreeable things; though it must be admitted that in this country they do not become so formidable as they sometimes do in Italy.

Thus far then with regard to the material used in moulding. In my next paper I will describe the tools and appliances used in the work.

## HIVES AND OTHER APIARIAN APPLIANCES.

BY APIS.

### THE "APIS" HIVE.

In designing a hive which was to be a standard form for my own apiary, and which, for want of a better name, I call the "Apis" Hive, I was governed by the following considerations. It should be capable of taking ten standard frames, and a dummy or zinc queen excluder; it should have double walls all round; the floor board should be movable, to allow of easy cleaning, the alighting board should be very broad and extend down almost to the ground. It should be suitable either for doubling or supering, the roof being able to hold a super-crate without any riser. The porch should be ample, and afford a good protection to heavily-laden workers returning home from foraging in showery weather, and it should be provided with a gutter, to prevent the water from dripping on the alighting board. The roof, as I said, should be deep enough to take a single crate of sections, and be high-pitched, so as to throw off the rain rapidly, and not let it lodge and soak into the wood. Finally, the whole should be within the capabilities of a moderately clever amateur: that is, not very difficult to make. Fig. 1 is a fairly correct view of my hive complete. The floor is nailed to two 9-in. boards placed on edge, and the alighting board is secured to the same. The brood-nest rests on the floor, and three slips of wood keep it in place. The porch and slides are secured with a couple of brass screws, so that they can be removed for doubling; the entrance way is cut out of the thickness of the bottom, so there is no space to fill in the upper of the doubled hives.

The hive, I think, is a good one, and fulfils all that I require of it.

Now to proceed to its construction. First, as to the wood required. Yellow pine would certainly be the best, but it is fairly expensive, and on that account would be beyond the pockets of some; next comes red deal; and last, perhaps, white deal. In any case the wood should be quite dry and seasoned. *For the brood-nest* the following pieces will be required: viz.—2 pieces, 17 in. × 8½ in. × ⅞ in.; 4 pieces, 17 in. × 9 in. × ⅞ in.; 2 pieces, 20¾ in. × 9 in. × ⅞ in.; 8 pieces, 17 in. × 1 in. × ⅞ in.; 8 pieces, 7 in. × 1 in. × ⅞ in.; these are all finished sizes. I begin with the brood-nest, because it is the principal foundation from which all our other dimensions must be taken. Its internal measurements, when complete, will be 17 in. × 14½ in. × 8½ in., thus allowing ¼ in. at each end of the standard frames, and the thickness of the top bar under them, for bee-way.

I may here remark that it is almost as quick and as easy to make two or three hives as to make one, all the pieces can be cut out so easily in duplicate; the planing can be done so rapidly when the hand is in, and the gluing and nailing of two is not a much longer job than of one. With regard to planing, it cannot be done too particularly. It is not enough to have the surfaces smooth, they must be true also; and to secure this, I generally finish them with the long trying plane. The wood should also be planed to a uniform thickness of ⅞ in.; the ¾-in. boards of commerce will, with care, clean up to this thickness.

Although I have given the dimensions of the various pieces as they will be required

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when nailing together, yet they will not be prepared and cleaned up in those short pieces; for instance, the two pieces 17 in. × 8½ in. × ⅝ in. would be left in one until they were planed, and if two hives were in course of construction, four such pieces, measuring something short of 6 ft., could be manipulated at once; so with the others.

Taking now the board which forms the first item in the list: when planed, it will measure 8½ in. × ⅝ in. × 34¼ in., the extra quarter inch in length being allowed for cleaning.

Run the marking gauge along one face ⅜ in. from the edge and bevel down to the mark, leaving somewhat less than an eighth of an inch flat on top, then cut the piece in two, 17⅛ in. long.

Now make out the four pieces, 17⅛ in. × 9 in. × ⅝ in., and the two 20⅞ in. × 9 in. × ⅝ in., these being without a bevel, and being each ⅛ in. longer than the finished sizes.

Next take the bevelled pieces, lay them on the bench with the bevels up, have the strips 1 in. × ⅝ in. in readiness, a pot of good hot newly-made glue, a packet of joiners' brads 1 in. long, a sprig-bit to suit, and a hammer. Give a good coat of glue to the flat piece below the bevel or to one side of the strip, lay the latter on the board, with its edge to the lower angle of the bevel, rub it up and down two or three times to spread and press out the glue, put a few sprigs into holes previously made, and nail the strip to the board. Nail another strip with equal care to the lower edge of the board, and when this is done, nail short pieces at the ends, fitting them in nicely and gluing them well, so as to make a trough ⅝ in. deep, which should be water and air tight.

Fig. 2.—View of Brood-Nest.

Do the same with the other bevelled piece, and when the glue is dry clamp the two together face to face, and, with the trying plane set fine, true off the ends square, both to the faces and edges. Then the slips may be anointed with glue, the pieces 20⅞ in. long laid on, with their lower edges on a level with the lower edges of the bevelled pieces, and projecting equally at each end, and nailed first with a few 1 in. sprigs, and afterwards with 1½ in. sprigs placed about 3 in. apart.

Two of the 17⅛ in. × 9 in. × ⅝ in. should also have strips nailed round them, even with the edges, and other boards 17⅛ in. × 9 in. × ⅝ in. nailed over them again in such a way as to form complete, closed in, air-tight boxes. These should be clamped together and the ends cleaned off true with the trying plane, as before; the length ought to be made 17 in.

If we treat the four hollow planks thus formed as the sides of a box, we shall have the brood-nest made. The longer boards attached to the bevelled pieces form a sort of rebate, into which the front and back fit nicely. The ends and rebates should be glued freely, and nails driven both from the sides and from the back and front.

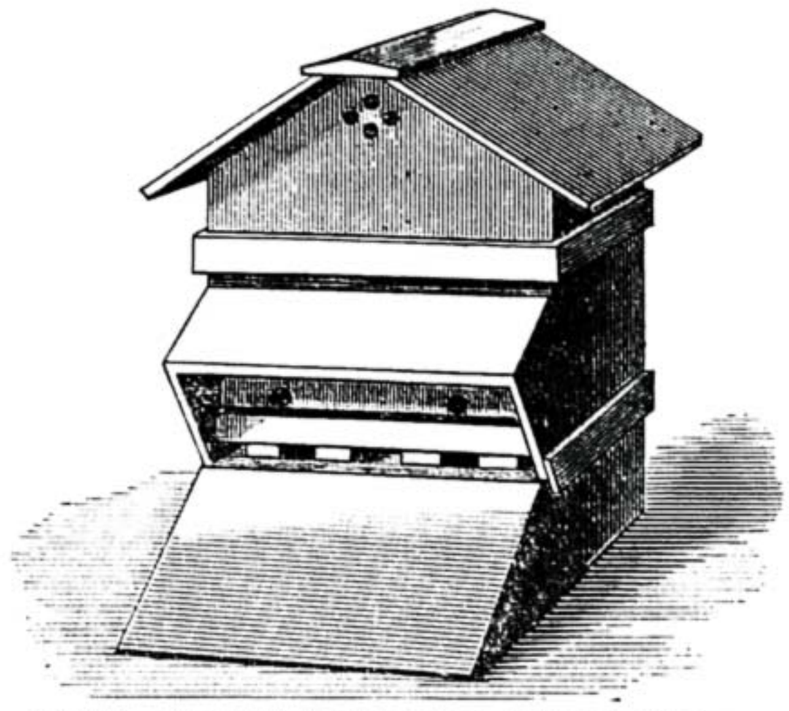

Fig. 1.—General Appearance of "Apis" Hive.

These latter will require to be 2½ in. long at least, and should be carefully bored for. Fig. 2 shows the brood-nest at this stage. I there show the plan which I sometimes adopt in fastening the parts together with round-headed screws having washers under their heads.

Of course, I need scarcely say that the brood-nest should be quite square, and that it should not be in winding, but sit flat and true on a perfectly level surface, which we hope to make of the floor board presently. The ends of the boards which project must be planed to a level with the front and back with the trying or smoothing plane, and the four sides brought to a finish with sand-paper, if necessary. We now turn to the floor. Its dimensions are ⅛ in. less than the length and breadth of the brood-nest, and it is made of wood 1¼ in. thick. For it the following pieces are required: 1 piece, 4 ft. 10 in. × 9 in. × 1 in.; 2 pieces, 1 ft. 6¼ in. × 11 in. × 1¼ in.; 2 pieces, 1 ft. 6¼ in. × 9 in. × ¾ in. As before, they may be planed in twos or threes, and separated only at the last minute, when about to be put together.

A distance of 21 in. may be measured along one edge of the board, 4 ft. 10 in. × 9 in. × 1 in., and the same distance, 21 in., measured from the other end along the opposite edge. These points being joined by a straight line, the board can be divided into two along this line, which will give us the two supports upon which the floor rests.

The pieces 1 ft. 6¼ in. × 11 in. × 1¼ in. may now be taken in hand, and joined together edge to edge. The best plan is to tongue and groove them—an operation which has been explained in a former number of WORK; but if this is not practicable, they may be dowelled together, or even nailed, using plenty of glue. Care must be taken that they are out of winding, and when the glue is dry the top must be gone over with the trying plane until it is as true as it is possible to make it. The under side, too, especially along the edges, must be made fairly level.

There is now a piece of wood 22 in. × 18¼ in., and we must plane the edges, and cut the sides until we get it 20⅝ in. × 18⅛ in., having the angles all right angles, so that the square shows it true all round.

The entrance way may now be cut in it. We decide which side is to be the front, find its centre point, and measure 4 in. from it towards each end. Then square lines, from those points, to the front edge; and, with the tenon saw make cuts ⅜ in. deep, and extending 6 in. or 8 in. from the front, and sloping upwards towards the centre of the hive. The part between these saw cuts may now be removed with a chisel and plane, finishing off, if desired, with a rasp and sand-paper. The entire floor may now be secured to the supports placed on edge, either with screws or nails, the supports being not more than a quarter of an inch from the edge of the floor board. The two pieces 18¼ in. × 9 in. × ¾ in., when planed and joined together edge to edge, form the alighting board. It is not so important to have this true as the floor board, but some care should be taken to see that the joint is good, and the edge which abuts against the floor must be bevelled so as to suit the slope of the alighting board. I generally secure it to the floor board with a glued joint and a few sprigs, but the floor may be made to

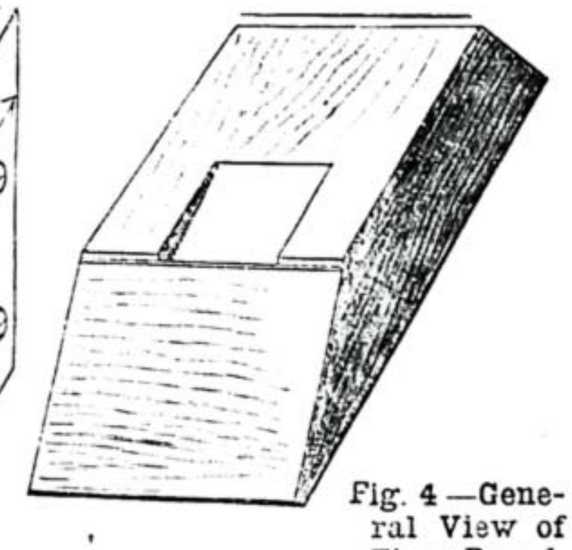

Fig. 4.—General View of Floor Board, etc.

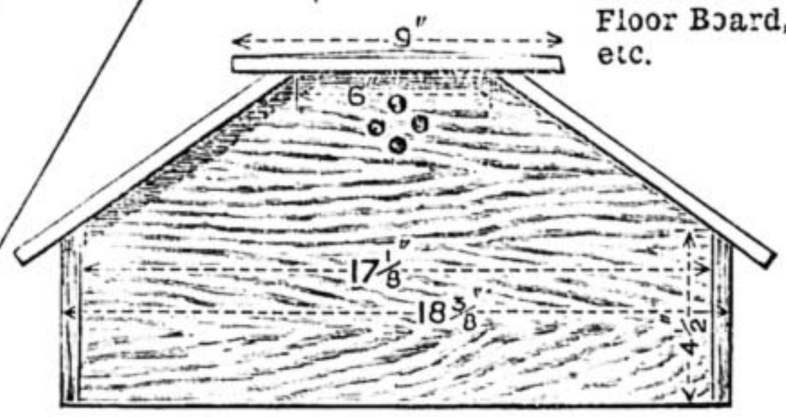

Fig. 5.—End View of Roof.

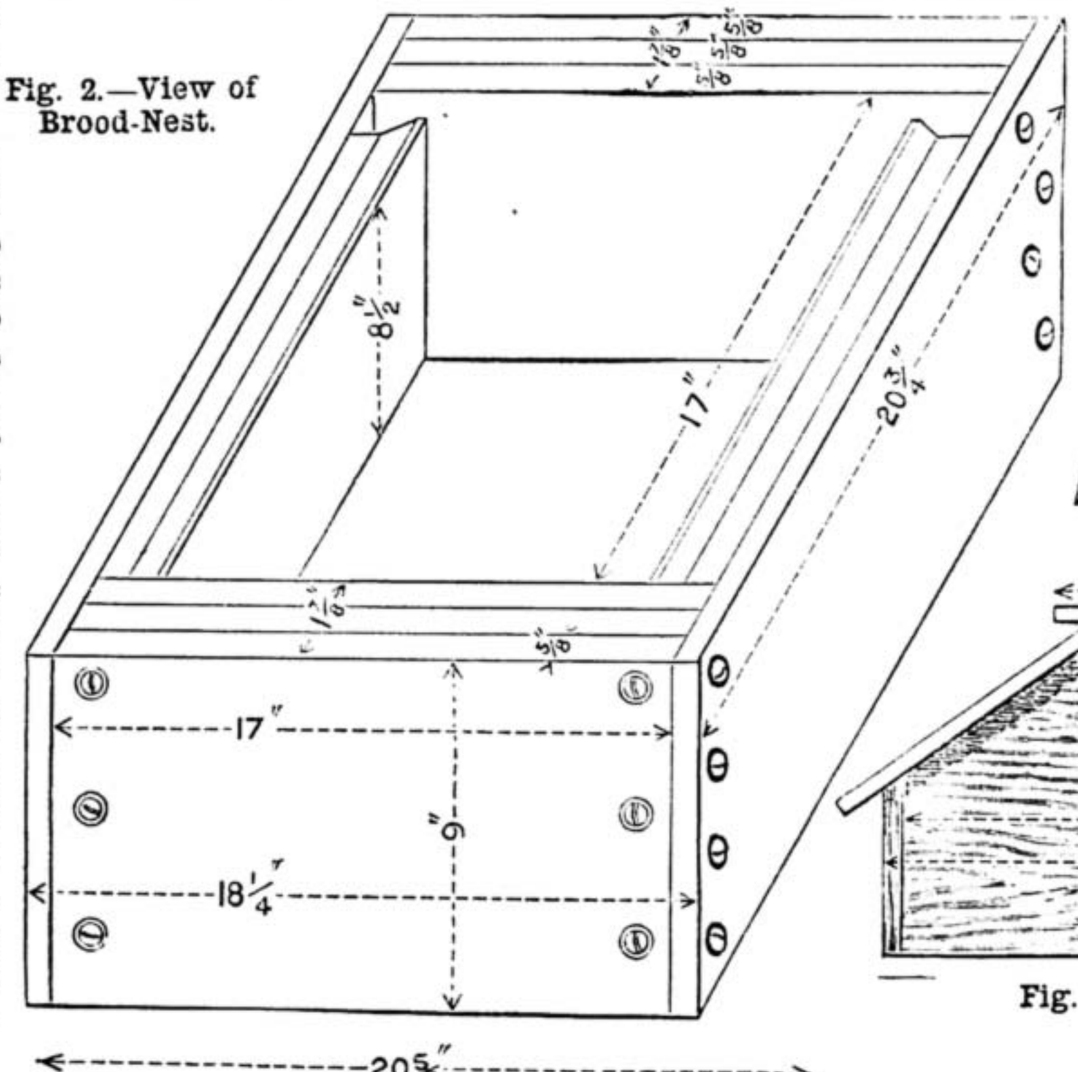

Fig. 6.—End View of Porch.

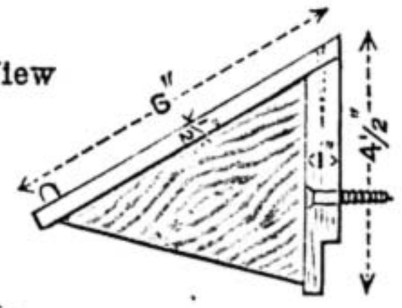

Fig. 3.—Side View of Floor Board and Stand.

[For continuation, see page 54.]

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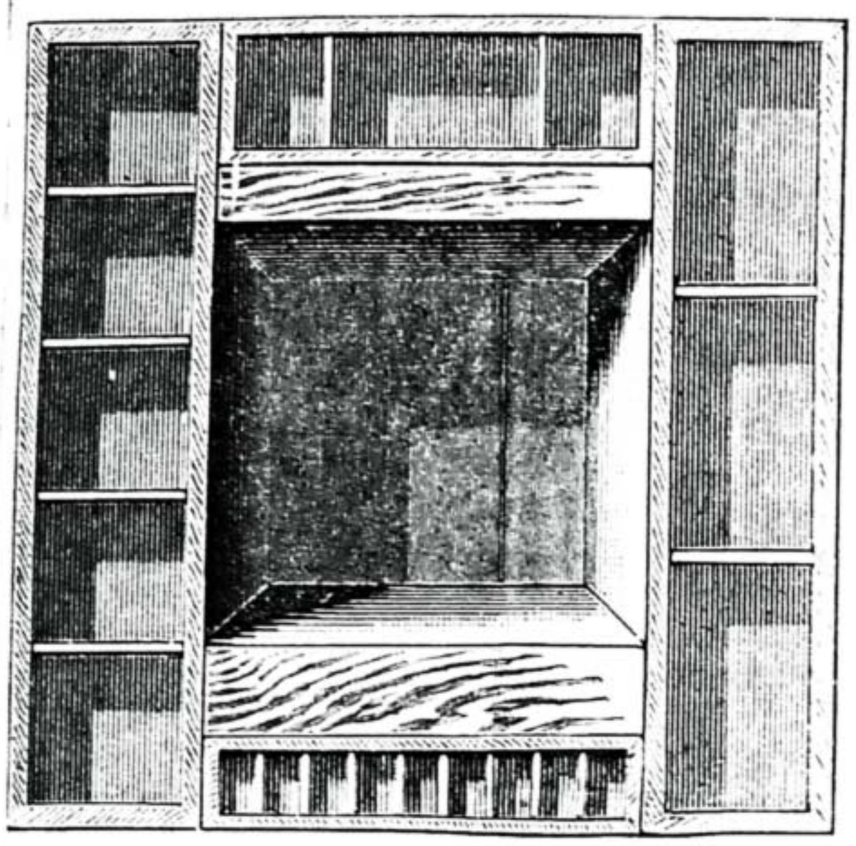
*For Description of Mode of Making "A Ladies' Combined Work Table and Escritoire," see pages 49, 50.*

Fig. 2.



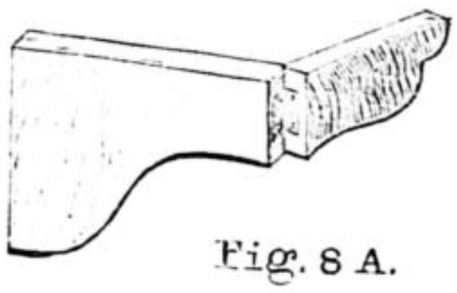


Fig. 8 A.

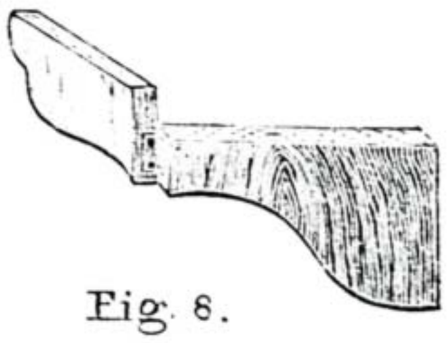


Fig. 8.

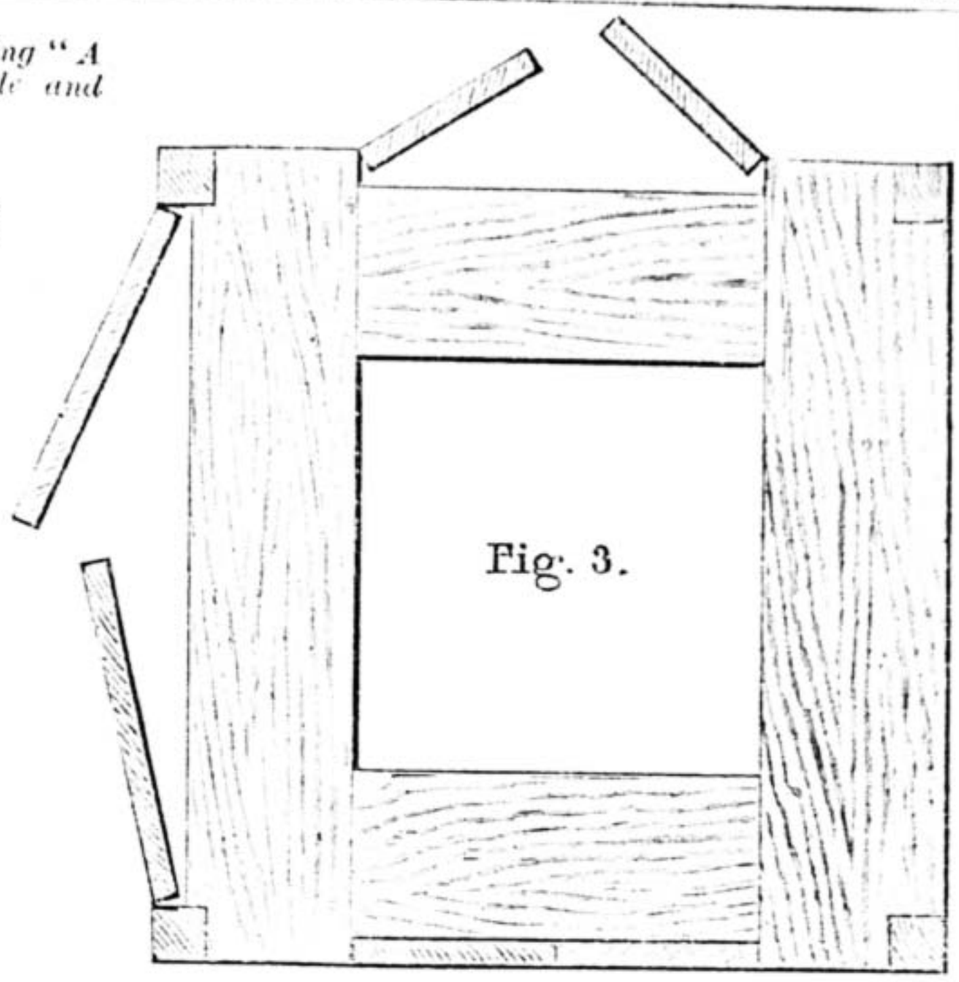


Fig. 3.

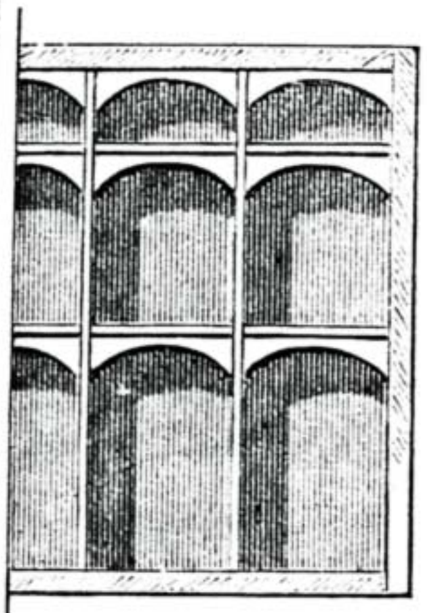


Fig. 7.

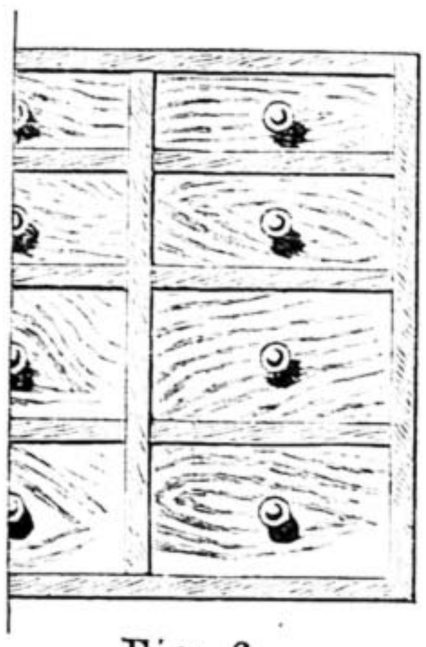


Fig. 6.

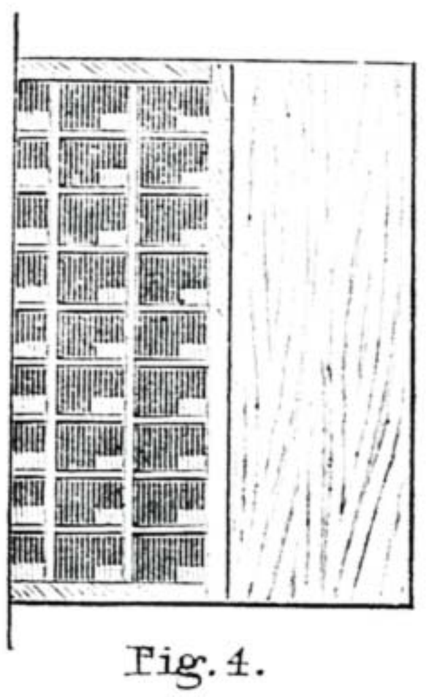


Fig. 4.

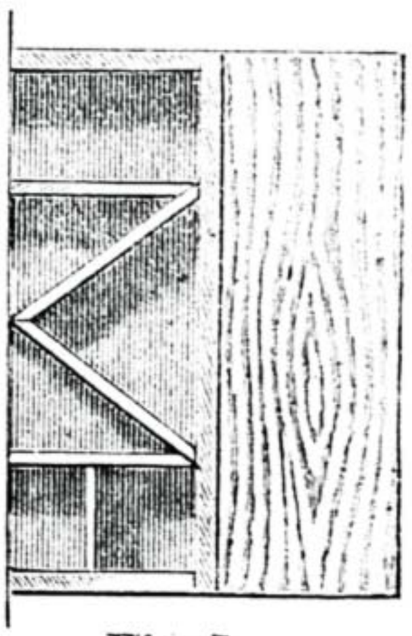


Fig. 5.

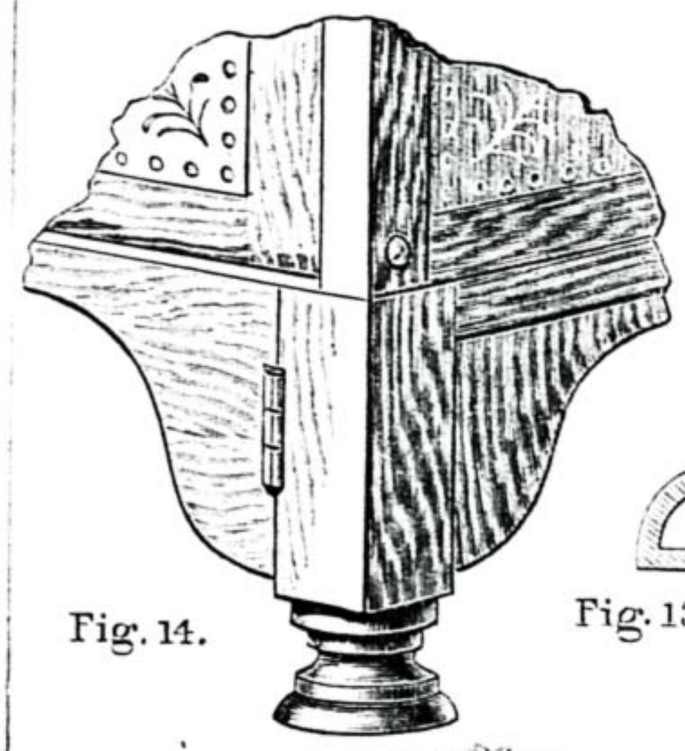


Fig. 14.

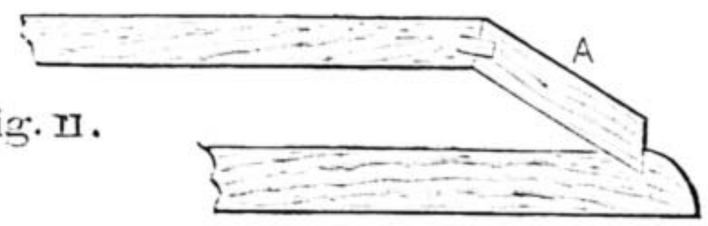


Fig. 11.

Fig. 12.

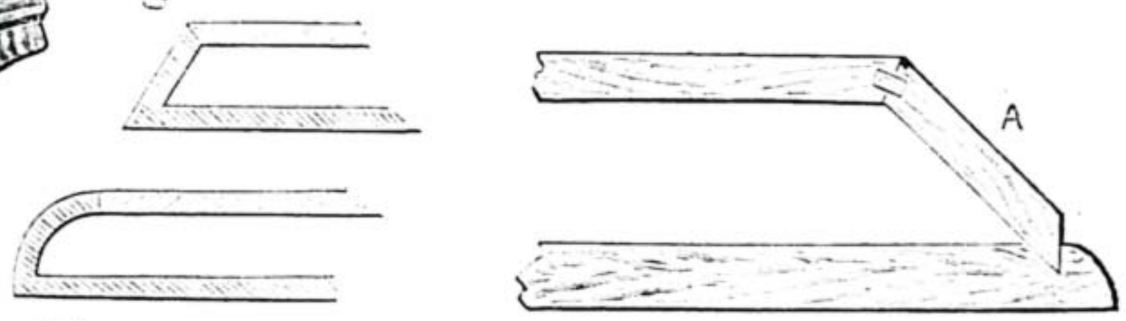


Fig. 13.

Fig. 10.

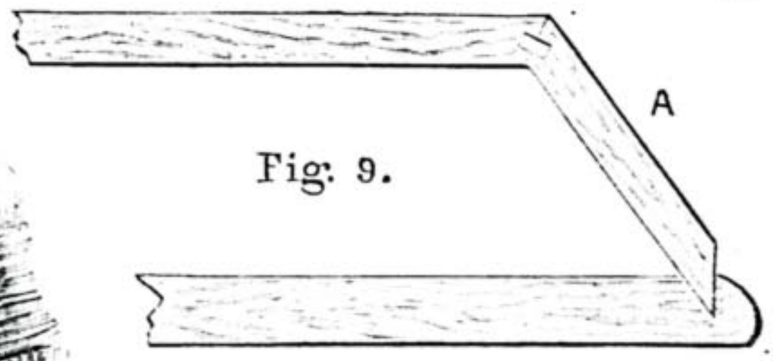


Fig. 9.

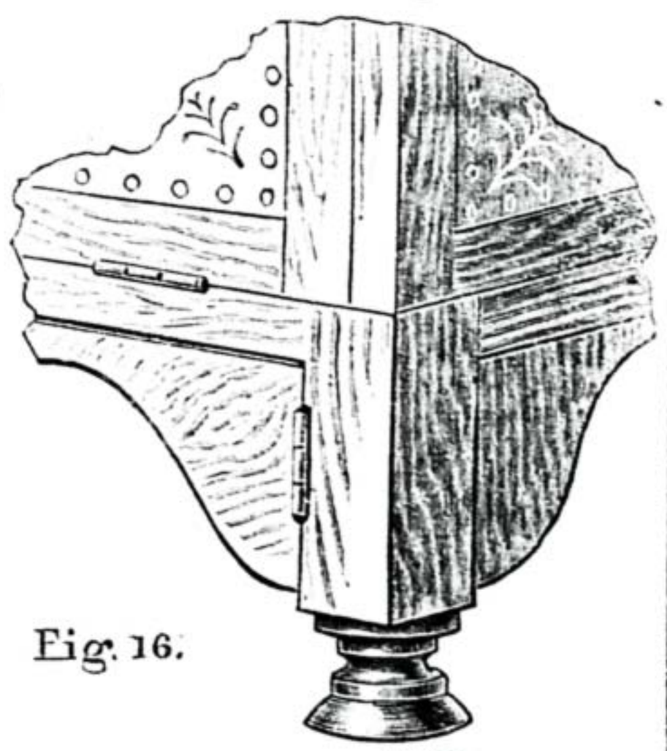


Fig. 16.

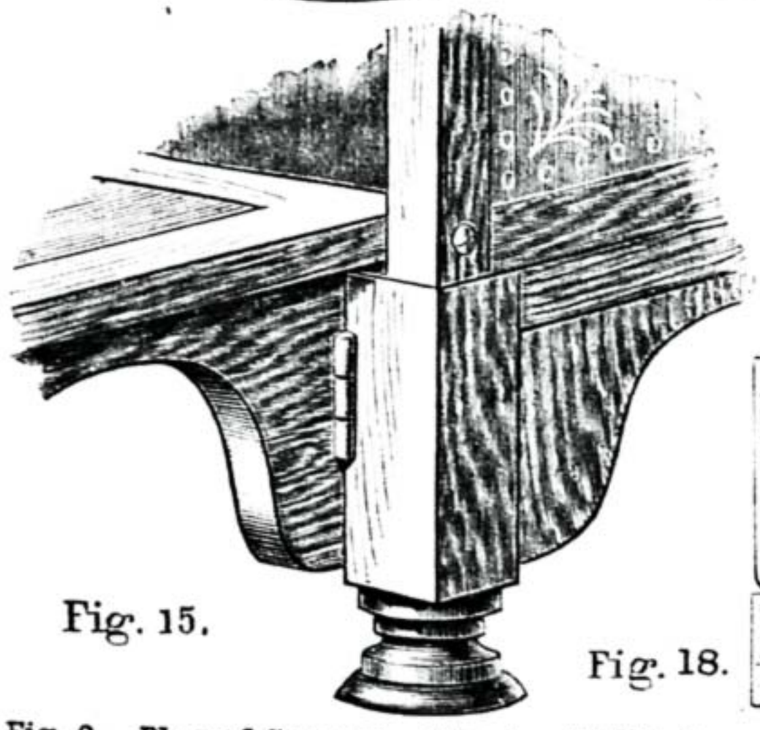


Fig. 15.

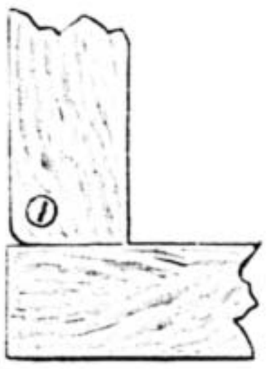


Fig. 18.

Fig. 19.

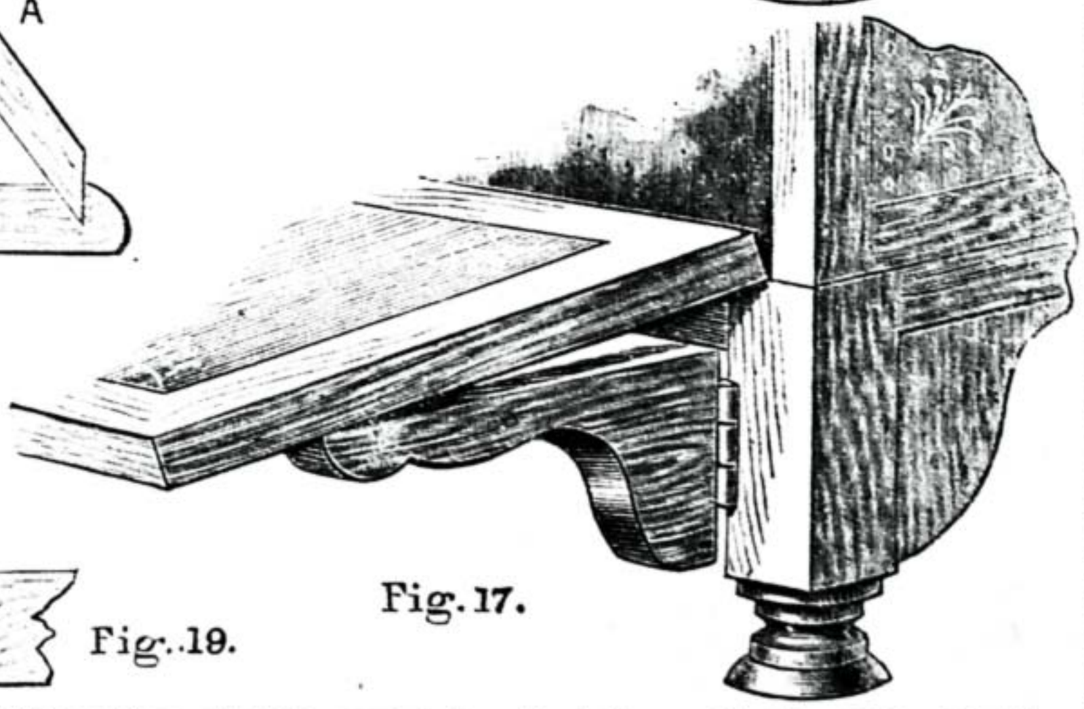


Fig. 17.

Fig. 2.—Plan of Carcase. Fig. 3.—Middle Board, showing Brackets. Fig. 4.—Half Elevation of Side containing Reel Box. Fig. 5.—Ditto, Needle Box. Fig. 6.—Ditto, Drawers. Fig. 7.—Ditto, Stationery Holes. Fig. 8.—Mode of cutting Smaller Brackets if Boxes work on Pivots. Fig. 8 A.—Ditto, if Hinges are used. Figs. 9, 10, 11.—Various Heights of Small Top Boards according to Width of Narrow Side Pieces (A). Figs. 12, 13.—Mode of shaping Front of Reel Box to afford freer Motion. Fig. 14.—Pivoted Flap in position. Fig. 15.—Ditto, as Writing Table. Fig. 16.—Hinged Flap in position. Fig. 17.—Ditto, as Writing Table. Fig. 18.—Section of Flap if Pivots are used. Fig. 19.—Ditto, if Hinges are used.

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overlap it by putting a rebate on its lower edge. The top edge of the alighting board must be planed to an angle, so that about ½ in. is horizontal, which will serve as a support for the slides. Fig. 3 is a side view which shows the floor and alighting boards and their supports. Fig. 4 is a general view of the whole.

*The Roof* now demands our attention, and for it we must make out and plane up the following pieces: viz., 2, 17⅛ in. × 9 in. × ¾ in.; 2, 20⅞ in. × 4½ in. × ¾ in.; 3, 25 in. × 9 in. × ¾ in. The pieces first on the list are to be cut to the shape shown in Fig. 5. The centre of one being found, a line is to be squared across it, and 3 in. towards each end measured along the edge; lines may be drawn now from these points to points at the ends of the board 4½ in. from the edge, and triangular pieces cut out, leaving the board as is shown by the inside lines (in Fig. 5). The narrow pieces are to be nailed to form the sides, and the top edges planed down to the bevel of the ends. Two of the 9-in. pieces, 25 in. long, may now be nailed to the ends and sides, and the top edges having been bevelled, the top piece may be nailed on. All these pieces, of course, should be well glued, which will make a much better job than nails alone. It would be well to have the top piece 1 in. thick in the middle, and to taper it to ½ in. at each edge. This will throw off the rain effectually. I sometimes have the side pieces 11 in. wide, which will permit me to have the top narrower, and, therefore, with a greater slope. Another plan I sometimes use is to have the roof consist of a number of strips 4½ in. wide, overlapping each other after the manner of weather boarding, but it is rather troublesome, for the ends must be cut into steps to suit the boards. Another plan still—and perhaps the best of the lot—is to cut the ends, from the centre of the top to the 4½ in. point, and to board it up like the roof of a house, without any flat piece at all at the top. The boards may be placed edge to edge. Then the whole top is to be covered with a piece of strong calico stretched tightly, and tacked under the eaves with a slip of wood covering the tack heads. A few coats of paint will make this quite water-tight, and as good a protection as it is possible to have.

The ventilation holes I have not yet mentioned. They may be bored either now, or, perhaps better, before the roof was put together. I bore three or four 1-in. holes in each end with a centre-bit, and nail a piece of perforated zinc inside to prevent the bees getting in.

If the brood-nest be now placed on the floor, it will be found to overhang it by $\frac{1}{16}$ in. all round, and the roof will overlap the brood-nest by a similar amount all round.

We must now procure seven slips of wood 2 in. wide, ½ in. thick, and 22 in. long to nail round the roof and brood-nest, so as to cover the junctions of the various parts. They should be planed at an angle of 45° almost to a feather edge on top, and the lower angles just rounded off. The roof will have slips all round, but the brood-nest only on three sides, the front being reserved for the porch. The slips may be mitred together at the corners, but it is almost as well to have them overlap.

*The porch* is made of four pieces of wood, two being the length of the front: viz., 18¼ in., and 5 in. × ½ in., and 4 in. × 1 in. respectively. The inch piece has a rebate 1 in. wide and ½ in. deep cut in its under edge, and the top is sloped to the angle the porch is to assume—about 30°. Then the top piece is nailed on to the bevelled edge, taking care to push it so far back that the edge can be planed flat at the back, then the triangular pieces are fitted and nailed in place. The entire porch is fastened to the brood-nest by means of a couple of brass screws, oiled before they are inserted so as to be easily withdrawn. To prevent the drip from the porch falling on the alighting board, I sometimes plough a gutter along the front of the porch, but usually I nail a slight piece of wood, rounded on the top edge, to the porch. This I bend in the shape of a bow, so as to direct the water towards the sides of the hives.

The doors or slides are the only part remaining to be done. If the brood-nest is brought to a level with the front edge of the floor board, it will be found that they can slide nicely on top of the alighting board, on the horizontal part prepared for them, and at the same time break the joint between brood-nest and floor board. If the porch is screwed just a little above the lower edge of the brood-nest, it will be found that pieces 4½ in. × 1½ in. × ⅜ in. will slide easily and act well as doors; little buttons may be attached to them by which they can be moved, but it is scarcely worth the trouble to do so.

Fig. 6 is an end view of the porch, which shows fairly its construction.

In making a hive, or indeed any other piece of work, it is of the utmost importance, if things are to be done with despatch, to have everything done methodically. While the saw is in the hand and the wood laid out, do all the sawing, then do all the planing and gluing, and so on. I therefore append a list of all the pieces (just fifty in number) required for this hive, as far as we have gone. The thickness of the wood may be varied, but the dimensions that I have given in the following table will, I think, be found about the best for the purpose in view:—

| *No. of pieces.* | *Length.* | *Breadth.* | *Thickness.* | *Object.* | *Remarks.* |
|---|---|---|---|---|---|
| | in. | in. | in. | | |
| 1 | 58 | 9 | 1 | Floor board supports | Must be cut into two, as Fig. 7. |
| 2 | 18¼ | 11 | 1¼ | Floor board | To be joined edge to edge. |
| 2 | 18¼ | 9 | ¾ | Alighting board | Do. |
| 2 | 17 | 8½ | ¾ | Brood-nest | Finished sizes, top bevelled. |
| 4 | 17 | 9 | | Do. | Finished sizes. |
| 2 | 20⅞ | 9 | | Do. | Do. |
| 8 | 17 | 1 | | Do. | Do. |
| 8 | 7 | 1 | | Do. | Do. |
| 3 | 22 | 1 | | For slips round brood-nest | Must be cut to length as required. |
| 2 | 17⅛ | 9 | ¾ | For roof | To be sloped for ends. |
| 2 | 20⅞ | 4½ | ¾ | Do. | May be cut from one 20⅞ in. × 9 in. × ¾ in. |
| 3 | 25 | 9 | ¾ | Do. | Will be changed for a roof either weather boarded or calico covered. |
| 4 | 22 | 2 | ½ | Slips | Will be cut to length as required. |
| 1 | 18¼ | 4 | 1 | Porch | To be rebated in lower edge. |
| 1 | 18¼ | 6 | ½ | Do. | |
| 2 | — | — | ⅝ | Do. | Triangular pieces. |
| 2 | 4½ | 1½ | ¾ | Doors | |
| 1 | 18½ | ¼ | ¼ | Gutter | To be bent like bow, with its highest part towards the hive. |

In my next paper I will describe how I made my Cowan Hive, and then I will go on to interior fittings. A Drawing-room Observatory Hive I look upon in the light of a luxury, and so will postpone its consideration for the present. If any readers wish for a paper on one, perhaps it may come later on.

## LAWN MOWERS: THEIR CARE AND REPAIR.

BY GRASS GREEN.

With the advent of Spring, a thousand and one readers of Work will doubtless lay aside their winter hobbies, and turn to their gardens, and their lawn mowers will be brought out for inspection and use.

Of course it is very dirty, at least ninety-nine out of every hundred will be, and it will be the object of this article to briefly and concisely describe the process necessary to put it into working order. Looking through a list of repairs, including several hundred machines by different makers, we find that nearly one-half are of the chain type, and of these a large majority are by T. Green & Sons, who were the original patentees of this pattern; since, however, their patent has expired, several other prominent makers have adopted the chain, thereby acknowledging its superior claim.

I will divide my paper into two parts, taking first the repair, and then the care, of lawn mowers.

Let us suppose that the dirty machine is before us, how shall we proceed with it and what special tools shall we require? Take the tools first. I will suppose the reader has the spanner supplied with each machine; to these he may add a common stiff scrubbing brush, an old knife, a lamp chimney brush, and some petroleum; a handful of cotton waste is also useful.

Not a very mechanical outfit, you remark. Well, no; one must admit they savour more of a housemaid's kit, but practice has proved them to be the most suitable articles for cleaning a lawn mower: they are eminently useful, and Work is nothing unless it is useful.

*Cleaning.*—Now take your machine all to pieces, taking care, if you are a novice, to mark each part, so that refitting may be done without mistakes as to hand and position of each part.

If it is intended to repaint the machine you may burn off the old paint, taking care to burn the paint and not the castings; the scrubbing brush will greatly assist this operation, and, when finished, the new coat will take to the iron smoothly and well.

If, however, the mower is to retain its old coat, it will suffice to scrape off the thickest of the dirt and then thoroughly wash and clean with the petroleum, taking particular care that the bearings are well and thoroughly cleaned. If it is a chain machine, let the chain soak, and then work it well with the hands—a rather dirty job, but the petroleum will in that way work out the grit and dirt, and render the chain easy and pliable; finally brush it well both inside and out. The cylinder may be scraped and brushed, but on no account subjected to heat, and this remark holds good, too, with the bottom blade. The lamp brush comes in here, and is admirably adapted for cleaning out crevices and curves.

*Grinding.*—Every part being clean, the next step is grinding. To effect this, fit the

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sides to the sole plate, and get the cylinder into its proper bearings; now prepare the grinding paste, made of 90-hole emery powder and oil mixed to the consistency of cream. Next rig a small cranked handle to the spindle and revolve the cylinder quickly in the direction opposite to that of cutting, applying the paste meantime, until the cutting surfaces of the cylinder and bottom blades are true with each other. A simple tool for applying the emery may be made by tacking a piece of leather or cloth on a wood slat, and then blocking it out with wood at each end, so that the leather stands clear of the wood slat. Smear the leather with the emery, and apply over the whole length of the cylinder. Grinding is rather tedious work, but absolutely essential, and will repay doing thoroughly.

To test the edges, moist tissue paper is a good test. If the machine will clean cut this at any point over its length, it may be safely considered properly ground.

Occasionally the knives in the cylinder may be so much out of truth that it is advisable to have them ground true in a proper mower grinding machine; most engineers have one of these, and will execute the job for a few shillings.

*Bottom Blade.*—A word about this important part, which should be quite flat and slightly turned upon its front edge. A warped sole plate will only cut part of its length, and leaves an objectionable rib on the lawn where it misses. When the turned edge has become worn, it will be cheaper to replace with a new one; returning and setting the front edge is difficult, and takes a lot of time and practice, and an undrilled plate can be bought for about 2d. or 2½d. per lineal inch.

The same remarks apply to the chains, pinions, and other wearing parts. Your ironmonger will procure any part for you at a reasonable charge.

I knew a man who undertook to make good a mower chain, which he did by driving out all the rivets, drilling out each hole in every link, and then riveting up again with larger pins; the job took about ten hours, and finding that his time cost more than a new chain, the experiment was not repeated. Chains for machines under thirty inches cost from 5s. to 6s. 6d.

*Bearings.*—A handy tool for boring the cylinder brasses by hand may be made by forging a small boring tool on a half-inch round rod with a T handle; both brasses are fixed *in situ*, with the tool threaded through one side, which forms a guide while boring the opposite brasses. The tool must be reversed to bore the second.

This method is far better than filing, to do which properly and truly requires much practice, and indeed is well-nigh impossible. One other wearing part is the wood roller fixing. These may readily be made good by bushing with a brass plug, and then drilling to size of spindle.

One very common cause of failure is looseness of knives in the cylinder. These are usually fixed with copper wire, and the defect may be remedied by removing the old and inserting new wire. Copper wire is best on account of its ductability, and it should be of such a gauge that a little pressure is required to drive it home. To effect this caulking, fix the cylinder in a vice and insert the knife in the slots provided in the collars, drive down the end of the wire horizontally between the knife and the collar, then double the wire back, and repeat the operation until the wire is on a level with the collar. After recaulking, the cylinder *must* be trued and ground in a proper grinder as before mentioned.

As regards our second part, three brief rules will enable users to get good results from their mowers:—

1. Keep them oiled.
2. Keep them clean.
3. Keep them adjusted.

The first should require no comment, but experience has taught us that many users neglect this all important point. No machinery works well without a proper lubricant, and lawn mowers are no exception. Use the best oil, and don't forget that the chain and knife edges will equally respond to the magic touch of the oiled feather; neatsfoot, sperm, or salad oils are best. Rule number two requires no further remark, but I would suggest that the lamp brush be kept in the shed, and used for brushing out the grass that necessarily accumulates about the mower. Adjusting is most important; most machines are provided with set screws by which the cylinder may be raised or lowered to the bottom blade. A badly adjusted mower will spoil itself and its user's temper at the same time. Adjusted too low, the cylinder and the bottom blade will cut each other, and only mangle the grass, or if set too high it simply won't cut at all, and if unevenly adjusted a combination results, in which one end cuts nothing, the middle may cut the grass, while at the other end the cutting edges will be engaged in the society game of cutting one another. The tissue paper test before mentioned is a good method to employ for adjusting.

Two other points of adjustment are the drum fixing for tightening the chains and the wood rollers, which regulate the length of cut; by raising these the grass may be cut shorter and *vice versâ*.

*Choosing a New Machine.*—A little disinterested advice on this point may not be out of place, for, of course, every trader will back his own machine against all others.

For general purposes I recommend a chain machine by any good maker, notably by Green & Sons, of Leeds and London, or Ransomes of Ipswich, both of whom turn out admirable and reliable machines. The latter firm also produce some excellent geared machines, as also do Shanks, of Arbroath and London.

The American type are too numerous to mention in detail, but most of them are admirably suited for long and coarse grass, and, if small, for borders and slopes.

For small lawns and small incomes, nothing beats Ransomes' New Paris mower, which is at once cheap, reliable, and easy to use—a ten-inch machine is listed at 45s., with box, and off this a substantial cash discount can usually be obtained.

In conclusion, always bear in mind that a lawn mower is quite as much a machine as a bicycle or sewing machine; treat it as you would either of those, and it will serve you quite as well.

## A CUPBOARD BEDSTEAD.

BY L. IVOR POOLE.

THAT a bedstead which can be folded up and concealed within, or made to resemble some other piece of furniture, is no new contrivance is well known, though to a great extent "combinations" of this class have given way to the lighter and more convenient forms of folding-beds. They are, in fact, a trifle old-fashioned, but that is no reason why they should be forgotten altogether. "The chest contrived a double debt to pay, a bed by night, a chest of drawers by day," may be as useful occasionally still as it was when Goldsmith wrote his "Deserted Village," and with this idea the following suggestions are given:—

It must not, however, be imagined that the thing referred to in the above quotation actually fulfilled the purposes of the two articles of furniture which are named. Fortunately there are not many of us who are so prosaic as the individual who wondered how it was that any one could allude to "sermons in stones, books in the running brooks, and good in everything," when it obviously ought to be "sairmons in buiks, stanes in brooks, and bad in most things," or it might be necessary to say that the chest enclosed a bedstead and was so finished as to resemble a chest of drawers when closed. The piece of furniture portrayed in Fig. 1 is, however, not designed to imitate the said chest, for, as the title indicates, it is a cupboard with little or nothing to distinguish it from an ordinary small wardrobe when closed. Such an appearance is perhaps to be preferred, savouring less of the sham, but perhaps the chief feature of the contrivance is its great simplicity. This will commend itself to most of those who are likely to require such a "spare bedroom," for reference to Figs. 2 and 3 will almost render any detailed account superfluous.

Fig. 2 represents the arrangement with the bedstead down, one door being indicated. The dotted lines show the folding part of the bedstead within the cupboard. Fig. 3 gives a front elevation with the bedstead enclosed. One door is shut; the other, that on the right, open, and thrown back to show the hingeing, the arrangement of this being also seen on the other, though apt to be overlooked by those whose observation is not sufficiently trained to enable them to perceive that the door is hinged on, and not within the ends.

The whole thing is so simple that it can scarcely be necessary to go into the minute description, the hints to be given being for men who may be supposed to have acquired a reasonable amount of skill and intelligence. They will know that the material is, of course, wood, which must be dry, that the joints must be properly made, that the more care taken with the work generally the better it will be, and that if they prefer to adopt any other detail of construction they may do so without feeling that they will be doing wrong. Glance at the general construction: First of all we have a full-length bedstead measuring 6 ft. 6 in. from end to end, and 1 ft. 3 in. high. The width is not of much consequence, as it can be anything in reason, though Fig. 3 represents it as being 3 ft. Were it not more than 2 ft. 6 in., a single-door cupboard would do very well, the door being arranged to open at the most convenient side. The height of the bedstead when extended may also be varied considerably, remembering that the lower it is the less will be the depth required of the cupboard from back to front, though its height will have to be proportionately increased. As represented it is about 1 ft. 7 in. deep by 7 ft. 3 in. high, including the cornice, which is merely an ornamental feature, and not an essential part of the construction.

The cupboard ends are shown as being in one piece from top to bottom, but, as this may make it rather cumbersome for removal, the alternative of making it in two portions, as frequently seen in wardrobes, may be

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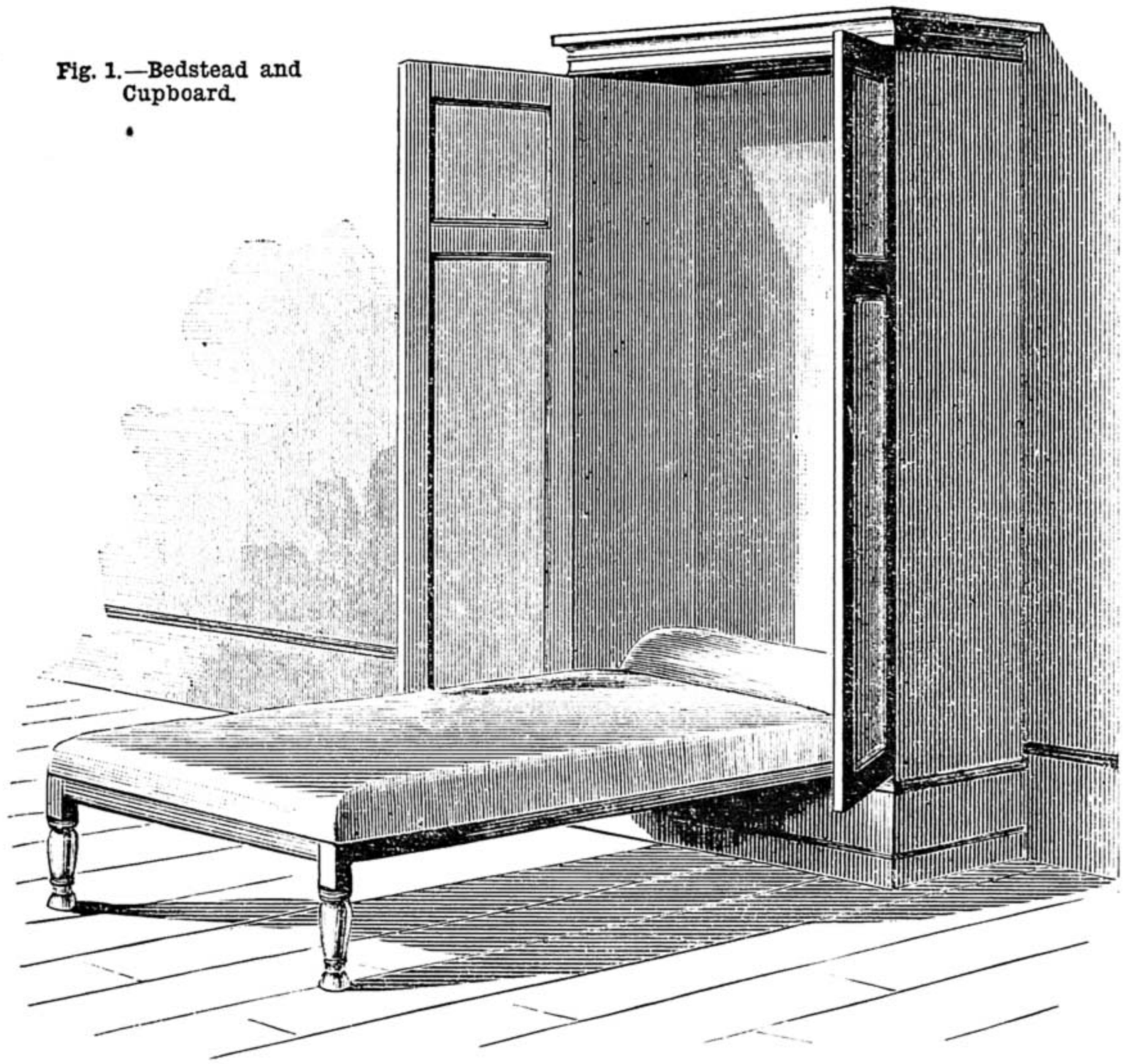

Fig. 1.—Bedstead and Cupboard.

adopted, the division naturally being between what in these would be called the hanging part and the drawer case. In Fig. 2 it will be seen that the bottom of the former and the top of the latter are combined by two bearers, one at the back and the other in front. These, of course, are securely fitted into the ends, the best joint for the purpose being the dovetail.

On top of them, and fastened to the ends, are the fixed portions of the bed rails, the movable parts being hinged on to these as shown. The side rails and foot end are fastened into the legs, and when it is said that the transverse laths to support the bedding are dovetailed and fastened into the frame (Fig. 4) to prevent them falling when the bedstead is folded, no further remarks need be made about this part of the work.

The lower part of the cupboard may very well be utilised as a place to keep extra bed-linen or other articles in. As will be seen, it is represented with a fall-down front, but, of course, a drawer may be substituted for this, or it may have a couple of doors opening in the usual way. The bottom is placed close to the ground in order to make the available space inside as great as possible, so that the plinth is added more for the sake of appearance than anything else. Were the plinth formed in the usual way, and put on below the bottom, naturally a good deal of the space inside would be lost.

The fall front may be secured with a spring catch, or with lock and key. To prevent the hinges being strained it will be advisable, if when open it does not rest on the ground, to fasten a joint stay or chain to it. Instead of gaining access to this lower receptacle from the front, a lid may be arranged to the top of the fixed portion of the side rails, the advantage of this construction being that the contents may be secured by locking the upper doors.

Trifling alterations of the details may be advisable, but these will no doubt suggest themselves.

The doors are made in the usual way, and may either have two panels, as in the illustrations, or only one panel each. In fact, what may be called the decorative portion of the work can be varied to almost any extent according to the taste and skill of the maker, the essential constructive features remaining unaltered.

Fig. 5 gives a suggestion for a folding footboard, which, hinged as it is shown to be, occupies very little space, and will no doubt be a comfort to those whose toes have a propensity to work down.

By making the supports at the bottom end fold under, the cupboard may be shallower from back to front than stated. Fig. 6 indicates how this may be managed, the legs there being shown connected by a couple of rails or stays, and hinged to the frame instead of as shown in Fig. 2. The hinges of course are so arranged that on raising the frame the legs hang down against it. By a very slight modification they may be arranged to fold within the side rails.

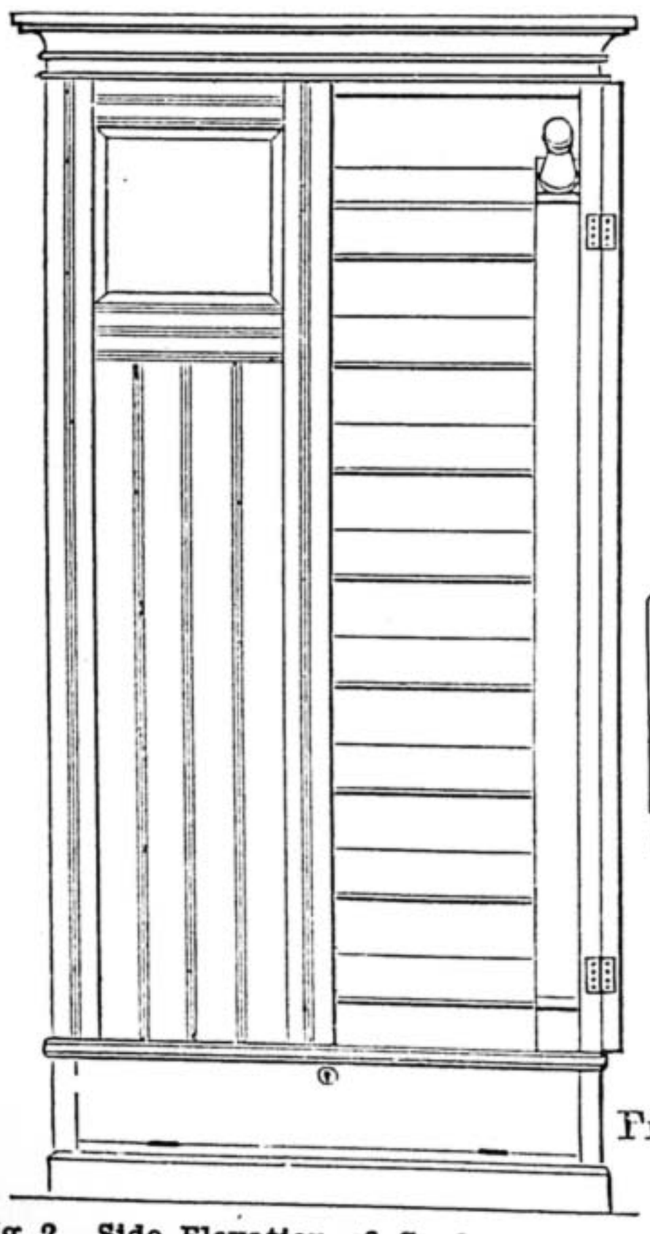

Fig. 3.

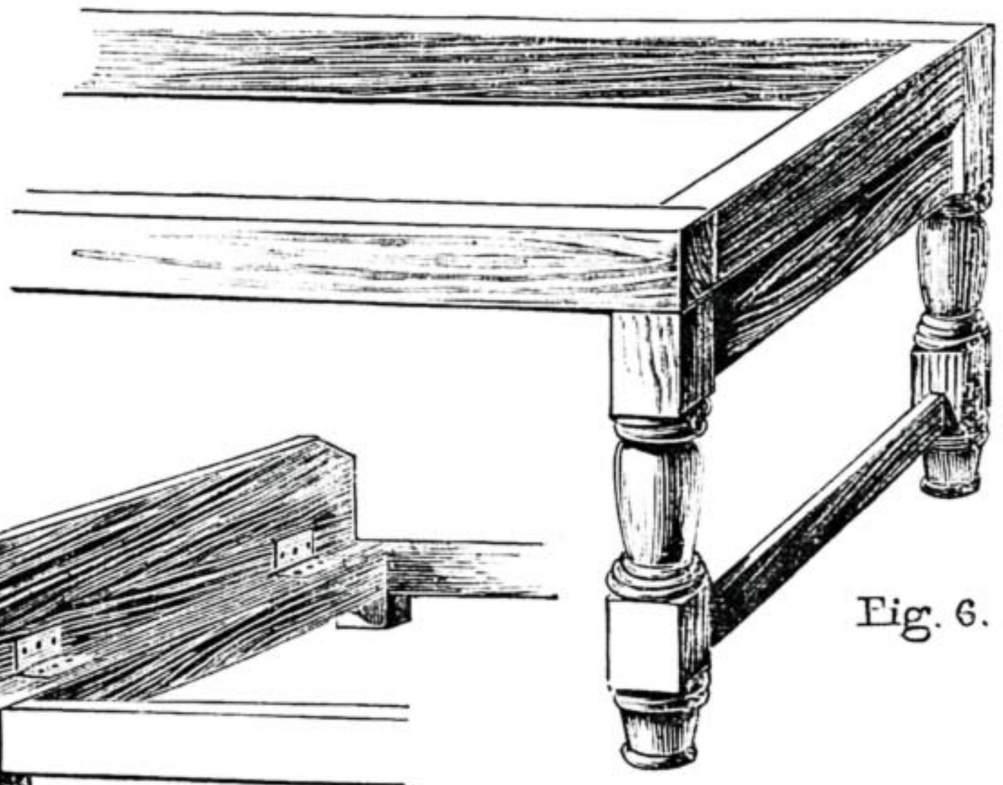

Fig. 6.

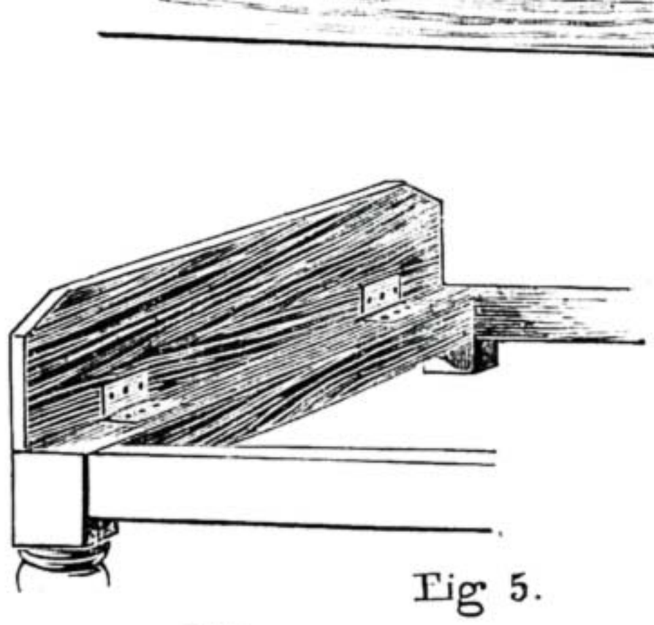

Fig 5.

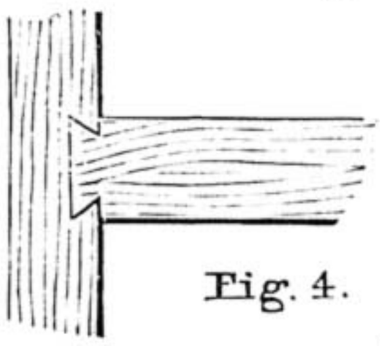

Fig. 4.

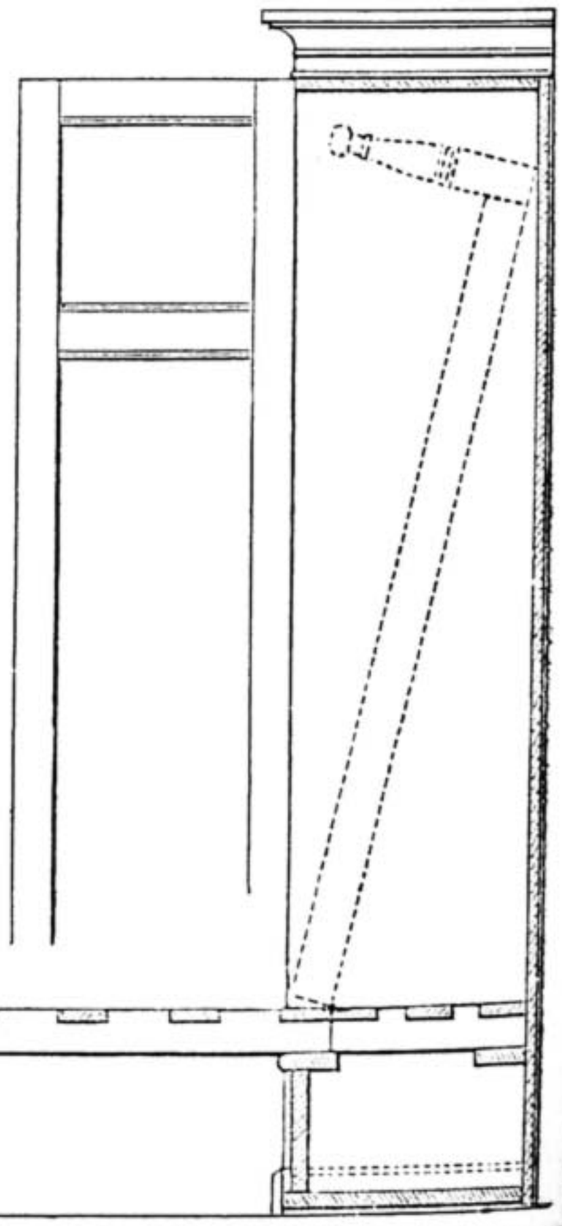

Fig. 2.

**Fig. 2.—Side Elevation of Cupboard Bedstead. Fig. 3.—Front Elevation of Cupboard Bedstead. (Scale of Figs. 2 and 3, ½ in. to 1 ft.) Fig. 4.—Lath dovetailed to Frame. Fig. 5.—Folding Footboard. Fig. 6.—Folding Legs.**

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Ample space is afforded for a thin mattress and the necessary articles of bedding in the cupboard; but if these have a tendency to push the frame too far forward so that it is apt to fall on the doors being open, a turn buckle on the under side of the frame, fitting into spaces cut in the ends, will prevent any mishap.

Only the general features of the construction have been touched on, as it is hardly possible to conceive a simpler contrivance, and the remarks have not been written for novices altogether, though even they can hardly meet with any difficulty they cannot overcome. I don't think it can be necessary to tell any readers of WORK, however inexperienced they may be, that at the bench they must stand on their hind legs, but it will afford great pleasure to assist those who don't require quite such elementary directions as far as possible in "Shop." If, therefore, any readers feel that they cannot understand some of the details of construction, they may be assured of friendly advice to help them if they will state where the difficulty arises. My friend, Dulwits, is not a mechanical genius; he wants to learn "how to make all sorts of things, you know," beginning at the beginning, but he cannot master the technical advice to get on his hind legs: till he does, I fear very much he will not be worth anything. It may interest some who sympathise with him to know that he has been advised to consort with the lower orders of creation, beginning with the pony—the Jerusalem variety—as being congenial.

## HOW TO HANG FORGE BELLOWS IN ROOF.

BY JOHN HEWITT.

IT is just twenty years ago since I was at my wit's end to do this seemingly simple operation. I was wanting to move into a more convenient shop; one was to let, but, for the life of me, I could not see how it would do, unless I could use the ground-floor space, where in ordinary usage the bellows should be, whether circular or "long shape." The shop was not high enough to hang a pair in the roof, as is usually done, so I was in a fix; a larger shop with two double-handed hearths I must have, and no other could I find.

After thinking over how I could fix a pair aloft, so as to have the space underneath, long and anxiously, I at last hit on a plan, and soon had it all at work in my mind's eye; so off I went and took that shop, and began moving into it. When I began fixing the bellows close to the roof, every one thought I was "cracked," and all wanted to know how I was going to blow them; and as I am very poor, even now, at sketching my ideas, and could not do so then, I could only say "wait and see." Scores came to laugh, even a practical bellows maker amongst them; and to hear the remarks as to what I should certainly be if I blew those bellows hung up in that way, made me almost think I was going to demonstrate I was the cleverest inventor that ever lived or would live. When all was in working order, and each had tried them, the general feeling was one of disgust, that such a simple and practical mode of hanging a pair of bellows had not been thought of before; they could not *then* see anything "clever" in it.

Seeing a paragraph in WORK on bellows, signed W. P., on page 606, Vol. I., which says, "I presume the long bellows you have bought are second-hand ones, as those who now go in for new bellows buy the circular ones, as they are easier fixed and take up less room"; and thinking many others do not yet know of the plan, I thought I would just send you a sketch and particulars, for if hung in this manner, they take up less room than circular ones, can be fixed at any angle to the hearth, and practically consume no power in the way of friction in the process of blowing, besides being cheaper in first cost.

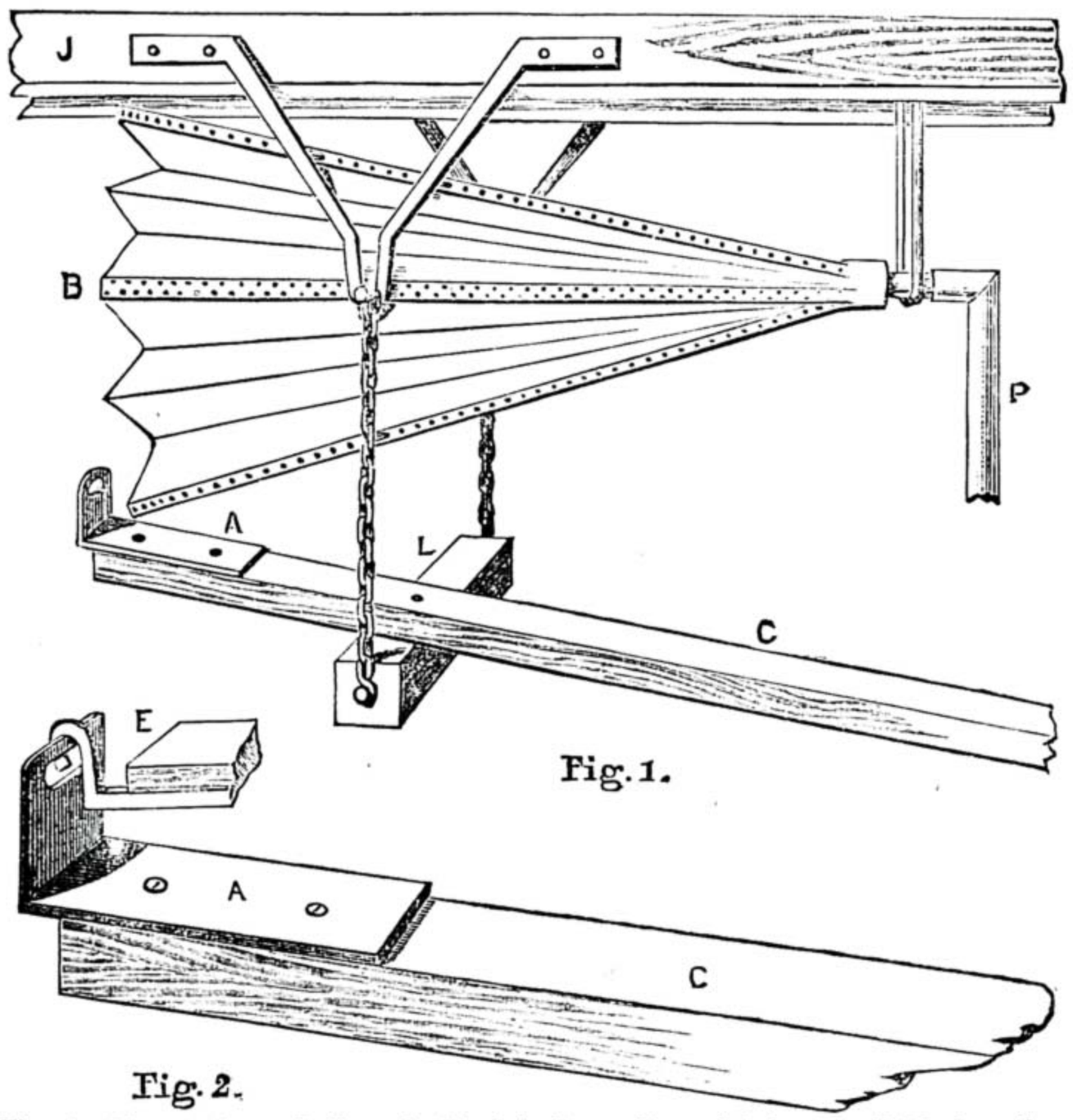


Fig. 1.

Fig. 2.

**Fig. 1.—Plan to hang Bellows in Roof to have Ground below available for other purposes—J, Joist in Roof; P, Blast Pipe; L, Fulcrum in Chains; C, Rack Staff; E, Hook on Bellows; A, Iron Plate with Eye for Hook, E, to work in. Fig. 2.—Enlarged View of End of Rack Staff.**

I think the sketch will explain itself. B, Fig. 1, are the bellows hung to the roof timber, J; L is a block of wood hung with chains to the bellows pins, for the rack staff, C, to work on as a fulcrum; a pin goes through C and L. The position and leverage of rack staff, C, is regulated by the position in which this pin passes through both or either, and its height by the length of the chains; P is the blast pipe. Fig. 2 shows how the rack staff is connected to bellows. At the bottom of all long shape bellows is a hook, E; this is engaged in an eye in plate, A, fastened on the rack staff, C; the top side of this eye should be nicely rounded, then, as you blow the bellows, it rolls in this hook without any friction. Previous to hanging the bellows this way, I had to fix a weight at E to pull the bellows down, but afterwards they went down quite quick enough, and blew very much easier too. The weight on the long end of rack staff keeps A, and hook, E, in position. There is one great advantage gained by the plan, viz., the *leverage* is always the same *at every part of the stroke* as the fulcrum *moves:* no other plan I have seen does this. The leverage can also be quickly adjusted.

I have blown and worked with a very many pair of bellows in my time, but with none can I acquire such a degree of "touch" as with those hung this way. With a skilled workman, it is not merely a blast he wants—he can have this with a fan or long chimney—he requires to vary that blast in the nicest way possible with some kinds of work; hence I think, if not generally known, it will not be unacceptable to readers of WORK.

## ADAPTATION OF SEWING MACHINE FOR FRET-SAW MACHINE.

BY C. H. M.

As many subscribers take an interest in fret-saw work, it may not be out of place to describe a fret-saw machine, which I made some time ago from an old sewing machine, especially as it embodies a method of controlling the direction of the cut which is the reverse of that generally adopted.

In the ordinary method of directing the cut, it is necessary to turn the piece of work which is being operated on so as to feed it against the teeth of the saw, and the beauty of the curves produced depends on the steadiness with which this can be done.

Also, however small an opening is being cut out, the work must at least be revolved completely round, and the size of the piece of wood that can be dealt with on any particular machine is limited to the distance that can be reached from corner to corner.

Now as a sewing machine has generally a comparatively small span, I adopted the course of making the saw revolve on its axis in place of turning the wood round, and with the result that it was possible to deal with a piece of wood twice the width of the span of the machine and of unlimited length.

Although in the first place I tried this system because the span of the sewing machine was so small, I found it a great improvement upon the usual method. Obviously, the saw can be turned on its axis in a fraction of the time taken to carefully turn the wood round, and it therefore results that curves and angles can be followed much more quickly. The cut is much cleaner, and bolder curves and sharper turns can be made.

To appreciate the difference in the facility of manipulation, take a sheet of stiff paper with a fret-pattern sketched on it, and hold a pencil in a fixed position, lightly pressing on the paper. Then try to follow the

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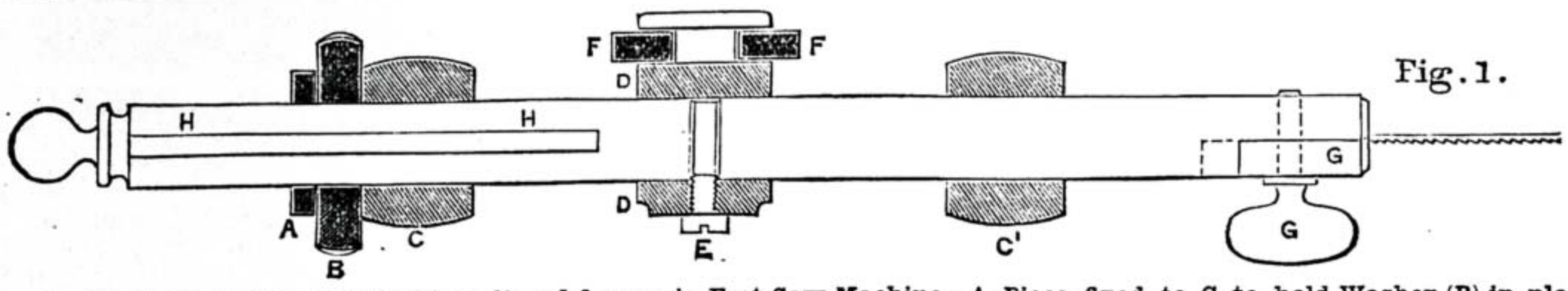



Fig. 1.

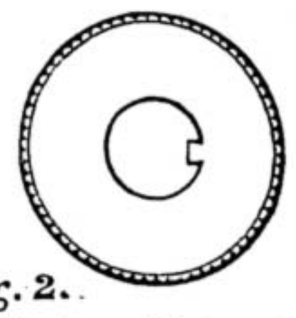


Fig. 2.

**Fig. 1.—Needle Bar of Sewing Machine altered for use in Fret-Saw Machine—A, Piece fixed to C to hold Washer (B) in place; B, Washer with knurled edge, shown in plan in Fig. 2; C C′, Bearings through which Bar is driven up and down; D D, Connecting Piece; E, One of the three Set Screws, the points of which project into the Groove in the Bar, and carry it up and down while permitting it to revolve axially; F F, Part Section of the Lever by which the Bar is driven up and down through the Connecting Piece, D D; G G, Small Vice at End to hold the Saw; H H, Keyway by which Bar is revolved while in motion up and down.**

pattern, first while assuming that the pencil will only mark in one direction and turning the paper to follow the pattern, and secondly, taking it that the pencil marks in any direction, and keeping the same end of the paper constantly towards you. The latter method will be found to be from two to three times the quicker, and a much more pleasant occupation.

In the next place a sewing machine generally has a short stroke, say only 1¼ in., but by the method I adopted of mounting the saw this was not a disadvantage, except that fewer teeth being brought into play the saw becomes blunt, and must be renewed the sooner. On the other hand breakages occur less frequently when the wood has not to be turned round.

The following is the description of the alterations to the sewing machine:—

1. The hole in the bottom of the needle bar plugged up, and a finer hole drilled to suit the size of the saw to be used, or the end of the needle bar fitted with a pair of vice jaws having a central nick to accurately determine the position of the saw when nipped in place, for it is important that when the needle bar is revolved the saw shall run true.

2. A groove turned or filed round the top of the needle bar, by which it can be driven up and down without interfering with its revolving movement.

3. A long keyway cut very truly along the upper end of the needle bar, by which the bar can be revolved without interfering with its upward and downward movement. The needle bar thus altered is shown in Fig. 1.

4. The saw works through a small hole in the surface plate of the machine, and this hole is bushed with a piece of steel of extreme hardness, otherwise it rapidly wears away. Where the surface plate is cut up with the feed gear, the plate is filled in solid again, and the hardened steel bush is inserted with its small hole accurately under the centre line of the needle bar, this accuracy being obtained by marking off its position by a sharp point fixed in the needle bar for the purpose for a moment. The steel bush, which is at least a quarter of an inch deep, has its small hole bell mounted top and bottom to avoid cutting edges, which would damage the saw, the bottom bell mouth being large to facilitate threading the saw into place.

5. The means employed of turning round the needle bar is a washer with a fixed key, made preferably of steel and with a knurled edge to give a good hold to the thumb, by which its motion is guided as the work proceeds. (See Fig. 2.) This washer and key must be a good working fit to the needle bar, that is, the bar should slide through easily when lubricated, but there should be no shake, especially in the key and keyway sideways. The position of this washer is at the top of the upper bearing of the needle bar when in place on the machine.

6. The usual presser, by which the sewing work is held down, is altered so that at its lowest position it rests on its stop, when it is a little more than the thickness of the wood above the surface plate. The work can thus slide freely under the presser, which holds it from jumping up, but the presser can be raised against the action of its spring when the work has to be taken in or out. A wide spreading fork at the bottom of the presser allows enough of the pattern to be seen between its jaws.

Beyond dismounting all the parts of the sewing machine which are not necessary for its proper working as a sewing machine and the fitting of a blower to carry off the sawdust, there is no other alteration made to the machine.

My experience is that there is no necessity whatever, with a short stroked machine such as I am describing, to highly strain the saw by screwing it up between the jaws of a frame, as is done in the usual hand tool. I found that the needle bar drives it up and down, while the bush in the face plate keeps it in proper line above the face plate. I found a slight tendency for the loose end below the plate to "whip" round, and so catch and break, but this was easily prevented by attaching a light elastic cord, having a tension say of from a quarter to half a pound.

This attachment may be made by softening the end of the saw in a candle flame and bending it into the form of a hook. It will be found that the steel from which these saws are made is of very poor quality, and they will not stand much bending even when soft. It seems a pity they are not made from square wire of a quality equal to pianoforte wire. Before putting the saw into the machine, the back should be filed smooth and the corners should be taken off; it will then work better against the side of the round hole in the surface plate, and it will also turn better in its cuts. As the top teeth wear out, the top of the saw can be broken off, as it is not, of course, necessary to work with a whole saw when so short a stroke is made by the machine. This system of holding the saw at the bottom by a hook necessitates threading the saw from below, first through the face plate and then through the wood; if this is not liked I have no doubt that a small vice jaw below could be used attached to the elastic band, but probably the elastic band would then have to be much stronger to set the vice jaw in motion quickly enough.

When working the machine the wood is easily guided by one hand, since there is no turning about to do, while the thumb of the other hand is kept constantly on the knurled washer by which the saw is turned about, so that its teeth face the line of the pattern continually. It is not necessary to see the direction of the teeth; indeed, this could hardly be done while the machine is running, but the feel of the cut tells where they are. The machine is of course driven by foot.

## OUR GUIDE TO GOOD THINGS.

### 6.—Broughton's Patent Combined Square, Mitre, and Bevel.

This handy appliance, the invention of Mr. Valentine Broughton, 7, Halford's Lane, Smethwick, Birmingham, who also manufactures and offers it for sale, is a useful combination of the square and bevel. The bevel is a sliding one, working on a screw in the stock of the instrument, which passes through a long slot cut in it. When not in use the bevel may be placed in the stock as shown in Fig. 2. Fig. 1 shows the bevel placed against the blade of the square for marking mitres, its proper position being indicated by a mark cut diagonally on the blade of the bevel, the outer edge of which is graduated in eighths of an inch. In Fig. 3 the square and bevel are shown as set for work required, and by the combination the change of tools for setting or marking out purposes is obviated. A scriber can be fitted and carried in a slot in the stock as shown in Fig. 3, and degrees can be cut on the stock to set the bevel to any angle required. The combination is certainly a desirable one, and will doubtless find favour with workmen. I do not know the price at which it is sold.

The Editor.

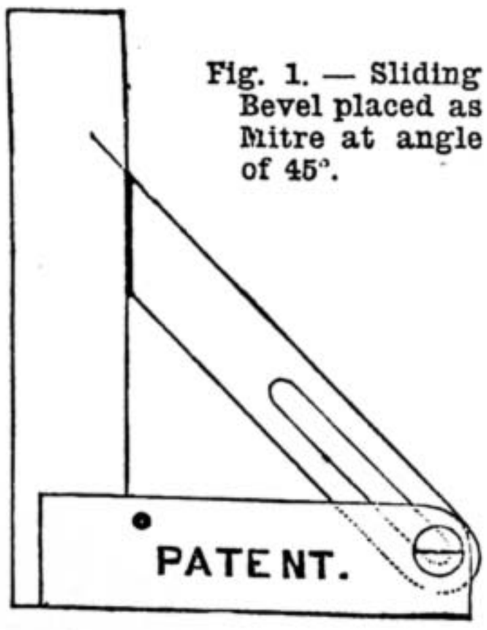
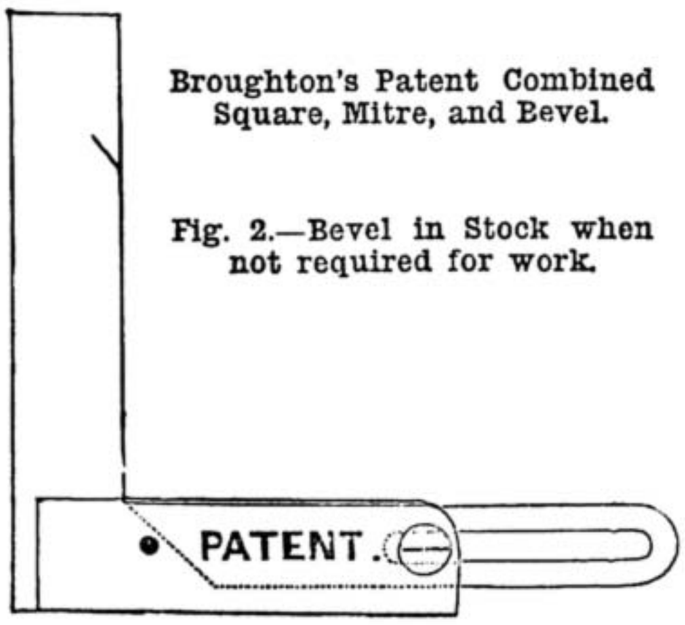



**Fig. 1. — Sliding Bevel placed as Mitre at angle of 45°.**




**Broughton's Patent Combined Square, Mitre, and Bevel.**

**Fig. 2.—Bevel in Stock when not required for work.**

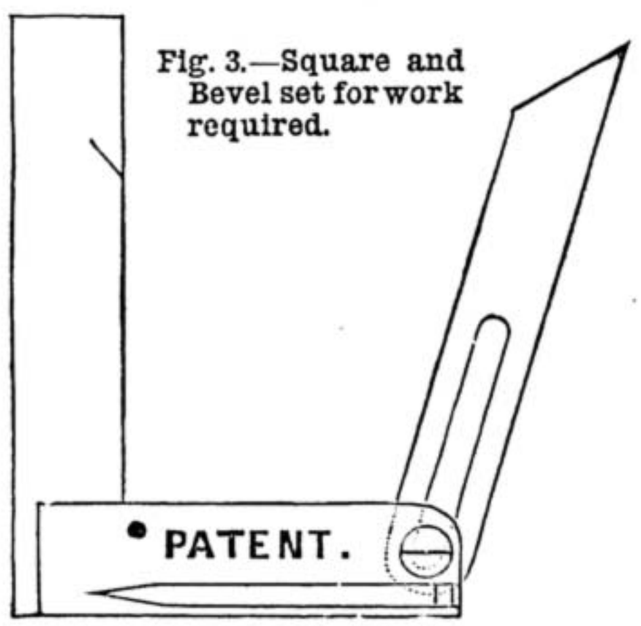



**Fig. 3.—Square and Bevel set for work required.**

# SHOP:

## A Corner for Those who Want to Talk It.

### NOTICE TO CORRESPONDENTS.

*** *In consequence of the great pressure upon the "Shop" columns of* WORK, *contributors are requested to be brief and concise in all future questions and replies.*

*In answering any of the "Questions submitted to Correspondents," or in referring to anything that has appeared in "Shop," writers are requested to refer to the number and page of number of* WORK *in which the subject under consideration appeared, and to give the heading of the paragraph to which reference is made, and the initials and place of residence, or the nom-de-plume, of the writer by whom the question has been asked or to whom a reply has been already given. Answers cannot be given to questions which do not bear on subjects that fairly come within the scope of the Magazine.*

### I.—LETTERS FROM CORRESPONDENTS.

**Child's Cot.**—F. J. A. (*Stoke Newington*) writes:—"With reference to the reply of J. G. W. to CLYDESIDE on page 732, Vol. I., of WORK, I enclose sketch of baby's cot which may be useful. I have two of this pattern now in use, a double one 4 ft. 6 in. by 2 ft. 6 in., and a single one 4 ft. by 2 ft.; these dimensions are very convenient for the purpose, and have the additional advantage of being 'stock sizes,' so that

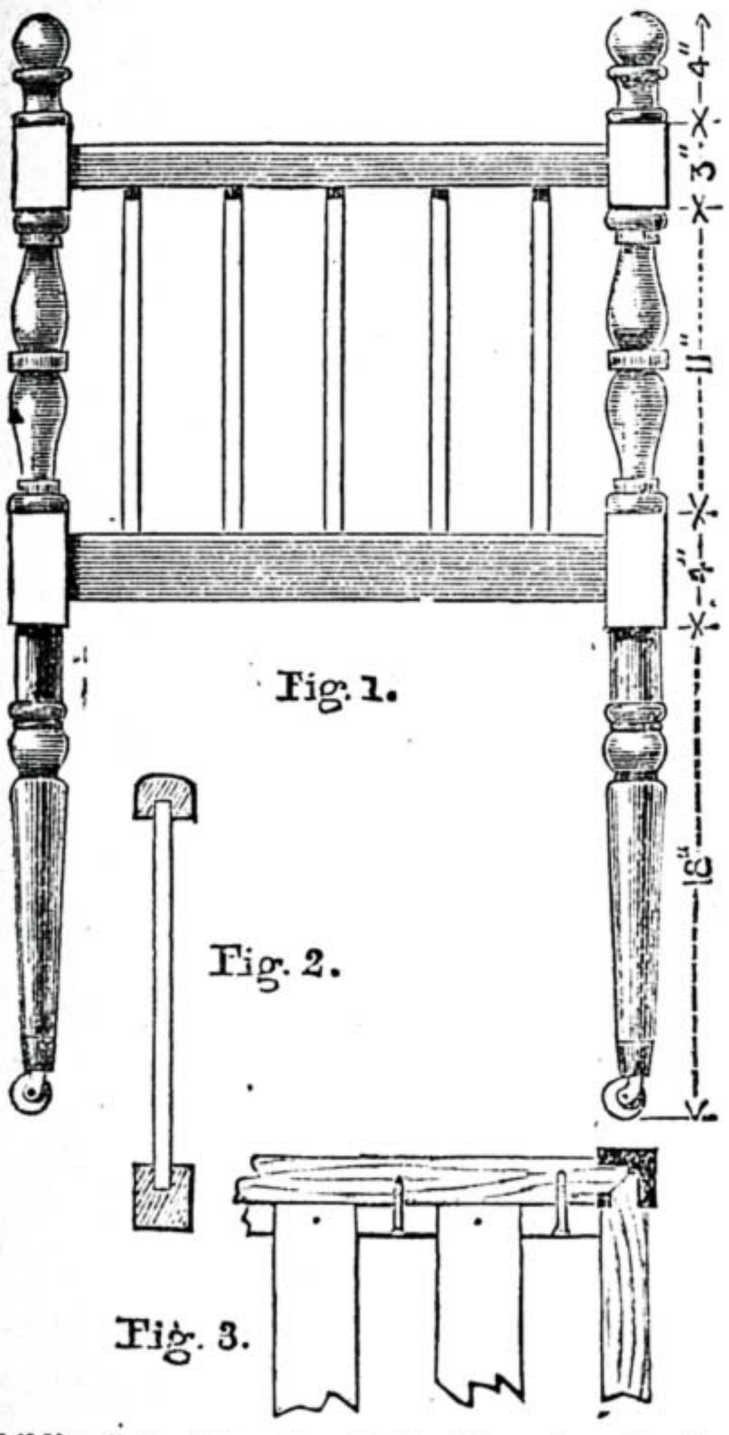



Fig. 1.

Fig. 2.

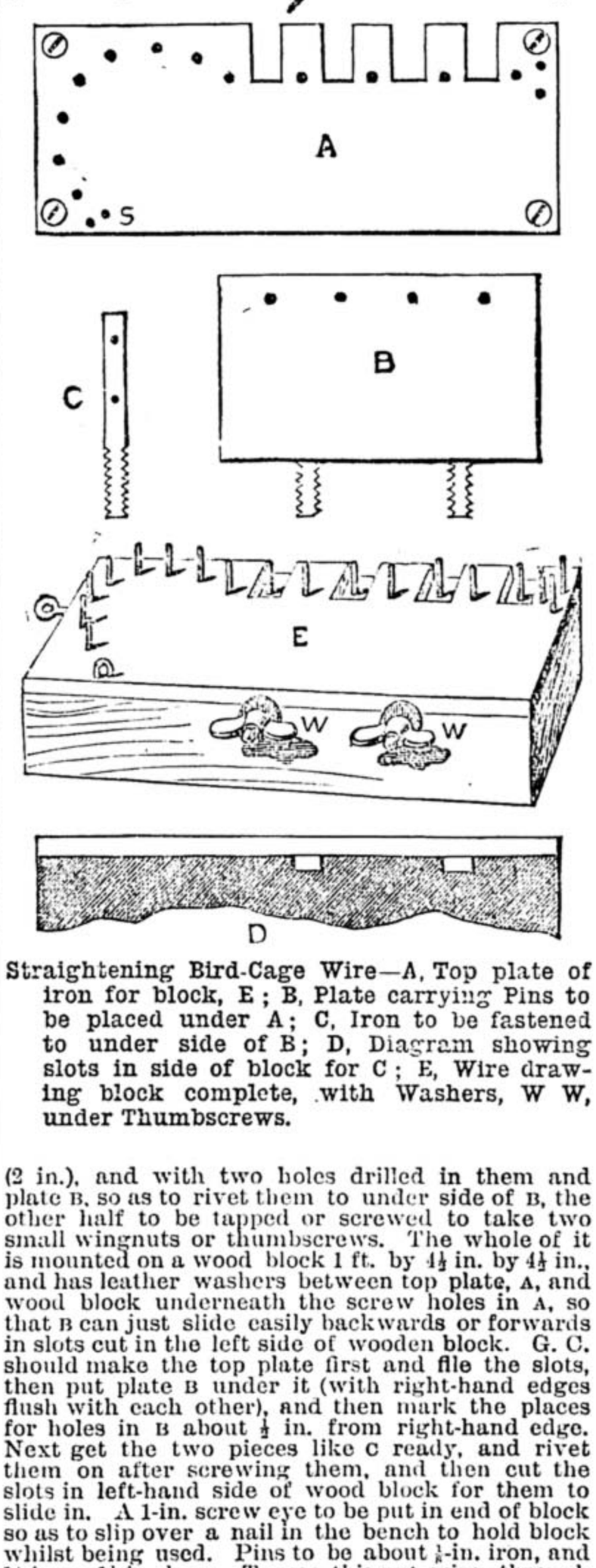
Fig. 3.

**Child's Cot. Fig. 1.—End. Fig. 2.—Section through Spindles. Fig. 3.—Section showing mortising of rails into uprights and arrangement of laths in bottom.**

there is not any difficulty in getting mattresses, etc., to fit. The four uprights I had turned by Messrs. Duffy & Son (at a cost of about ninepence each) out of 2-in. stuff; the top rail is 1½ in. square, with the top corner or edge rounded off; the bottom rail 2 in. by 1½ in.; these rails are mortised into the uprights as shown in Fig. 3. The design might be elaborated by having the spindles turned to match the posts, but mine are made of ¾-in. round rods which can be procured at most wood-yards in 12 ft. lengths; holes are bored in each rail to receive these spindles, which are glued in, and must, of course, be put in before the rails are fastened to the uprights. I do not think that sacking nailed to the frame as suggested by J. G. W. would be of much use for the bottom, for the simple reason that the children would dance it out in about a week; mine is made of laths 3 in. by 1 in. with a space of 3 in. between each; they are let into a piece of 2-in. by 1-in. stuff, which is screwed against the long bottom rails, as shown in Fig. 3. To simplify the construction if required, the four uprights might be made out of 2-in. square stuff, stop-chamfered and castors omitted. The cot may be finished by painting or staining and varnishing, or with Aspinall's enamel. I should have used the latter method if I had been acquainted with it at the time I made my cots; as it is, the larger one is painted in purple-brown and varnished, and the smaller one is painted with black bicycle enamel picked out with gold paint."

**A Simple, Easy Method to Braze a Band Saw.**—G. W. (*Bournemouth*) has kindly written on this subject, and his communication is acknowledged with thanks. It is, however, unnecessary to insert it, as full instructions on the subject have been given in the article "How to Mend a Broken Band Saw," in page 13 of this volume.—ED.

**Straightening Bird-Cage Wire.**—H. S. (*London, N.W.*) writes:—"In No. 27 of WORK (see page 429, Vol. I.) there is a query asked for straightening bird-cage wire, and I hope the enclosed will suit him and also other readers of WORK. A is a top plate of iron ⅛ in. thick, 10 in. long by 4 in. wide, and dots on same denote where holes are to be drilled for pins to be inserted and riveted upon reverse side. B is a plate of ¼-in. iron 6 in. by 3½ in., showing pins which slide in the slots in plate A. The two projecting pieces, C, on plate B are two pieces of ¼ iron wire flattened for half their length




**Straightening Bird-Cage Wire—A, Top plate of iron for block, E; B, Plate carrying Pins to be placed under A; C, Iron to be fastened to under side of B; D, Diagram showing slots in side of block for C; E, Wire drawing block complete, with Washers, W W, under Thumbscrews.**

(2 in.), and with two holes drilled in them and plate B, so as to rivet them to under side of B, the other half to be tapped or screwed to take two small wingnuts or thumbscrews. The whole of it is mounted on a wood block 1 ft. by 4½ in. by 4½ in., and has leather washers between top plate, A, and wood block underneath the screw holes in A, so that B can just slide easily backwards or forwards in slots cut in the left side of wooden block. G. C. should make the top plate first and file the slots, then put plate B under it (with right-hand edges flush with each other), and then mark the places for holes in B about ½ in. from right-hand edge. Next get the two pieces like C ready, and rivet them on after screwing them, and then cut the slots in left-hand side of wood block for them to slide in. A 1-in. screw eye to be put in end of block so as to slip over a nail in the bench to hold block whilst being used. Pins to be about ⅛-in. iron, and 1¼ in. or 1½ in. long. To use this put wire through the staple and round the curve, and on inside of first pin of B, so that the wire is between pins on A and B. Then put pressure on with thumbscrews from left-hand to suit wire according to thickness. D, showing slots in side of clock for C; C to be fastened to under side of B; E, showing wire drawing block complete, with washers, W W, under thumbscrews. I wish WORK every success."

**A Simple Incubator.**—J. T. R. (*Newcastle*) writes in reply to A. R. (*Manchester*) (see page 651, Vol. I.) regarding the lamp, and how it is used:—"I beg to inform him that the tube which runs through the tank is turned down or elbowed at its entrance, and turned up at its exit, as in Fig. 1. The chimney of the lamp is allowed to enter the tube at A, and care should be taken that the chimney is only a shade smaller than the tube. Any lamp will do providing the consumption of oil is not too great for the pocket of the operator. A difficulty will, most likely, arise as to where the lamp should stand. I adopt the plan of allowing the incubator to project a little over the end of the table, and then fix a bracket on the end rail just sufficiently easy to allow of the lamp being taken out for refilling and trimming. With regard to the drawer and its position, I am afraid our mutual friend, the Editor, has, in his discretion, suppressed some part of my letter and sketches, but as I have not a copy of my communication, I will not press the indictment. The drawer is the size of the tank bottom in width, plus the thickness of packing and wood at the front in length. The appearance of the drawer when made is as shown in Fig. 2.

Fig. 1.

Fig. 3.

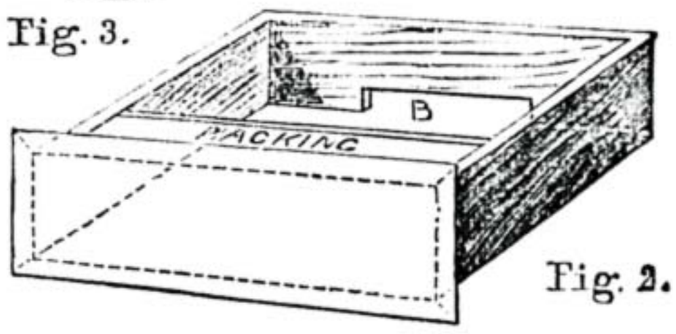



Fig. 2.

**A Simple Incubator.**

The drawer has not any bottom, and a piece is cut out of the back piece at B to allow of the drawer being withdrawn without touching the damper, which latter article rests on the floor of the incubator. Now as to where you put the eggs. If your drawer is 6 in. deep, and you are going to attempt a hatching of hen eggs, a piece of small mesh wire netting should be procured and fastened all round the inside of drawer 2 in. from top. This is the actual bottom of the drawer, upon which a piece of flannel is laid, and upon which the eggs are placed. A 16-in. square drawer will hold about sixty eggs. The damper is placed over a hole bored through the floor of incubator (by the way, said incubator must stand on feet an inch or so high to allow air to get to this hole), say, 1½ in. diameter. The damper made of tin is not easy to describe, and the Editor must, therefore, oblige by reproducing my sketch. A piece of coarse canvas must be placed across, and the edge hangs over the inner circle of tin into the water placed therein. I trust this will enable A. R. to understand the construction of a really useful incubator."

**Combination Bedroom Suite.**—J. S. (*London, N.*) writes in sequence to T. B. R. (*Hull*) (page 555, No. 35, Vol. I.):—"Certainly I am not offended by your remarks. I thank you for your suggestions, but I cannot quite agree with you in one or two things. (1) Concerning the side door, I may say it does not show the thickness. See reply to ONE IN A FIX, page 29, Vol. II. (2) The back of the looking glass might be made less objectionable by hingeing a piece of wood 3 or 4 in. wide the whole width of the door, so that it will answer the same purpose as that shown when the door is down. (3) If the wash-hand basin were in a drawer, what would support that drawer when it is pulled out? You might have a pair of brackets hinged like those under a table flap, but they, or, I think, any other method, would be equally as unsightly as the glass door projection. (4) You will see that in my written article I say that space, etc., were what I considered mostly; therefore, if the cupboard is made ten or twelve inches wider in front, it will make a much bigger job than I intended. (5) The glass door could most certainly be made lower down if required, so that the fastening can be the easier reached, but the average Englishman is tall enough to reach it where I have placed it. However, do not think that I am following in the footsteps of M. Eiffel, by placing the desired object where it will require some exertion to attain it. Personally, if the fastening were 7 ft. high, I could manage to reach it without laying myself open to ministerial reproof. (6) Perhaps, if some of the wood were thicker, it would be preferable, although I stated it ½ in. intentionally, as the quantity of wood used in the article would counteract the thin appearance it would otherwise present."

### II.—QUESTIONS ANSWERED BY EDITOR AND STAFF.

**Printers' Rollers, etc.**—J. R. M. (*Edinburgh*).—J. R. M. is impatient. If WORK were twice the size it is, it would be quite impossible for some of the answers to be published for a week or two afterwards.—J. W. H.

**Taking Out a Patent.**—TEST (*Cleckheaton*).—Probably before this can appear, TEST will have read in WORK some remarks on registration, in continuation of the paper on Patents. Whether registration will in his case be sufficient, depends on his invention. Registration protects shape or pattern only, which a patent is said not to do. If the invention is an instrument having any mechanical action, a patent will be needed; if it consists in a shape or pattern only, registration will suffice. The stamp or form for registering a design (to be got at a post office) is 10s.—C. C. C.

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**Violin Necks.**—J. W. (*Battersea*).—Give the neck a strong coat of vandyke brown dissolved in ammonia; this will sink deep into the bars. When dry, sponge the colour off until you get the shade you desire. I should not think of treating any other part in the same way. You will have particulars of the whole process when the papers on violin making (which are waiting their turn) are published.—B.

**Wainscot Painting.**—W. B. (*Walsall*).—I conclude it is grained-oak colour that you require, and not a plain white-lead paint. For the former, give your new work two coats of any light oily paint, then a coat of buff, made from white-lead, patent driers, and linseed oil and turps, in equal proportions of the latter, and stained with yellow ochre to a strong buff. Then purchase or make your graining colour, using burnt Turkey umber for the basis, and rub on thinly and comb with one or two varieties of steel combs, drawing it along the grain of the wood. When dry, coat with hard drying oak varnish. Previous queries recently answered on graining will apply equally well to your case. Remember that each coat must be laid on evenly and not too thick, and that each in turn is thoroughly dry. The depth of ground, or last coat, governs generally the finishing colour, allowing for the further darkening from the graining colour. If you merely require plain oil paint, this will be best made with white-lead and yellow ochre and burnt umber, in about the proportions of two of each of the first to one of the umber, adding patent or liquid driers, and beat up with two parts linseed oil to one of turpentine.—F. P.

**Brazing Cycle Joints.**—G. L. (*Sheffield*).—(1) This may be readily done on an ordinary smith's fire, using charcoal instead of the ordinary smithy coal. Borax is a chemical bought as a powder. Spelter is simply soft brass turnings or filings. The borax acts as flux in soldering, penetrating to every part of the joint to be brazed, when applied in a moist state to the heated joint. Proceed as follows:—Have the fire bright and clear, without smoke, and gathered to as small compass as possible; moisten some borax in a saucer; heat the joint over the fire, but not up to red heat; apply the borax all round the joint, when it will fizzle and flow into all parts. Put some wet borax inside the tube, and let it run down to the joint; put in also some spelter in the same manner, and on the outside; bind a piece of soft brass wire round the joint—the wire less than ⅛ in. thick; place the work over the middle of the clear fire, but without allowing the brass on the joint to touch the cinders; blow steadily, and place a piece of wood over the joint—the burning wood will throw its heat down upon the joint; apply now and then some dry borax on the joint at the brass wire. The borax will melt first, leaving the part wet and greasy-looking. When the iron is up to a clear red, but not white, heat, the brass wire will melt, as also the spelter inside. The moment it melts remove from the fire, scrape off the scale with a bit of iron hoop or old knife, and lay the work aside to cool of itself. When cooled with water while yet red it makes the steel tube brittle. (2) To clear sofa of moths, have all the stuffing taken out and teased of hair; coat the frame several times with paraffin, using a brush; wash the canvas; after teasing the hair, burn some sulphur under it, then let upholsterer do up the sofa. No moths after that.—A. S.

**Flattening Sheet Iron.**—H. S. (*Clapham Junction*).—See "Wrought Iron and Steel Girder Work," page 167, Vol. I.—F. C.

**Sun-Dials.**—ADALIA (*Asia Minor*).—A paper on the construction of sun-dials, vertical and horizontal, appeared in WORK, No. 54.

**Microscope.**—A. C. C. (*Battersea Rise*) asks how to make a double eye-piece for the microscope described in WORK, No. 22, "how the lenses are arranged, likewise the prism." Now I have to confess that I do not know what A. C. C. means, unless he wants to know how to make a binocular microscope. This arrangement involves a second tube, also a prism, but whether this is what the correspondent means I cannot divine. If he will state what he requires distinctly, I will help him as far as I can, but he must understand that to make a binocular involves much more manipulative skill than an ordinary microscope, and when made will not be of much practical service.—O. B.

**Glass Grinding.**—E. S. (*Tottenham*) asks:—"Can any one tell me the sort of tools I want for grinding glass, and the way to set about doing it when I have got the tools?" Is not this somewhat vague? For instance, one can grind glass with a common grinding stone, or, if such a tool is difficult to use, well then it can be ground on a doorstep. But, seriously, what does E. S. wish to do or make? Is it lens grinding, speculum grinding, or what? Until that is made clear nothing can be done. Perhaps E. S. will say what he wants to do, then we will help all we can.—O. B.

**Tinfoil for Mirrors.**—B. J. C. (*Silvertown*).—You ought to experience no difficulty in procuring tinfoil in London. Any of the mathematical instrument makers, such as Dale, in Ludgate Hill, will be sure to have it. I have sometimes got it at a chemist's shop. If my memory serves me, I have paid about 1s. 6d. per lb. Glass, when silvered in this way, is not usually painted on the back, but when by the chemical process, it needs painting for protection.—O. B.

**Printers' Roller.**—J. R. M. (*Edinburgh*).—To mould a composition roller for letterpress work, the mould consists of two iron semi-cylindrical pieces hinged together. In it is placed a wooden roller-block half its diameter. It is then closed, and the composition in a melted state is poured in, and allowed to cool, when the moulding box is opened and the roller taken out. The smoother the iron mould is the better is the surface of the roller. It should not, however, be used for a day or two; nor should it be kept in a hot place or a damp one. Turpentine will clear from it the ink, which should be done every time it is used. If it loses its suction or bite on the form and table, it may be sponged over with water and left to stand a few minutes, which revives it. Type may be also cleaned with turpentine or paraffin oil if of wood, and should be slightly oiled afterwards and wiped with a rag. Metal type is cleaned with pearl-ash and water and a brush, and afterwards rinsed in water. Any printer's broker will have moulds for casting rollers, will supply "compo" ready mixed for melting and running into the mould, and sell the roller blocks and handles for any size of roller. The composition may be of any thickness from three-quarters of an inch to twice that, or even more still.—J. W. H.

**Case for Stuffed Birds.**—F. M.—I send a rough sketch of birdcase, but F. M. does not state the size he requires it nor how many birds he wishes to put in, neither does he say if he wishes it square or canted sides; of course all the above directions would help me to give a more complete description. If your correspondents will give me full details I shall be pleased

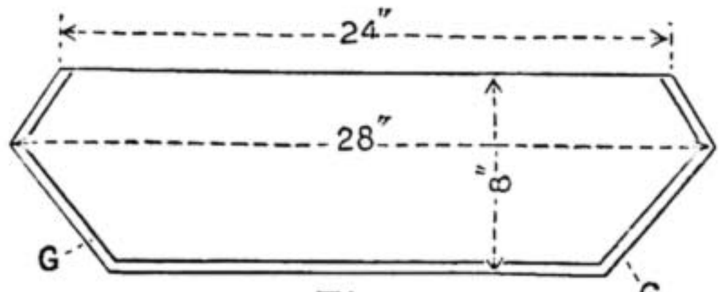


Fig. 1.

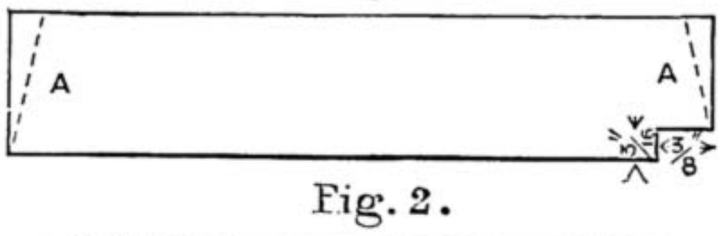


Fig. 2.

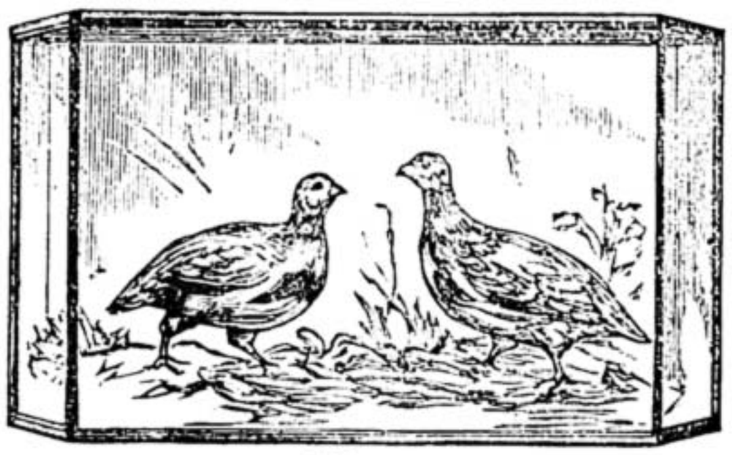

Fig. 3.

**Case for Stuffed Birds—G G, Groove for Glass; A A, Section of End Pieces.**

to help them, but I cannot find time to solve the problem of what each individual exactly wants. To make a canted corner case to hold, say, a pair of grouse with rockwork, procure two pieces of dry pine 24 in. long, 11 in. wide, and ½ in. thick; plane them up and join them together side by side by groove and tongue, making a tight joint and gluing them securely; then take two pieces each 8 in. wide, ¾ in. thick, and 28 in. long. After planing up cut them like Fig. 1, then run a rabbet round the front as shown in section and along each end; then procure two more pieces 18½ in. high for uprights at back ends, the same strength as the top and bottom; run a groove up one side of these the same size as the others in the top and bottom, then nail them together, and you have a case that will look well with gilt moulding round the front and up the angles. After nailing the two end pieces on to the top and bottom, bevel the ends as shown in section of end piece to let the back lie close; trim it to size required and nail it on; sandpaper it well up, and then you will have a case strong but light; you can put in your birds to taste and use gilt moulding to finish.—W.

**Gold in Bookbinding.**—P. C. (*Manchester*).—If you have a "blocking-machine," as you call it (the proper term is "blocking-press"), the method of procedure in gold-blocking is as follows:—Light the gas which is to heat the press, and, of course, the stamp, as you cannot get gold to stick on any bookbinding material without heat. While this is going on, prepare your books or book-covers, as the case may be. If they are cloth, give them one coat of glaire—being an apprentice bookbinder you will surely know what glaire is—and allow them to dry thoroughly. If they are of leather, wash them first with paste water and give two coats of glaire, allowing the first to dry before applying the second. When all is ready, see that the press is hot enough, and, having arranged your stamps, or block, and gauges, lay on the gold on the covers in the usual way, using olive oil—sparingly—for cloth and morocco, and lard for calf. Be careful to lay on sufficient gold to cover all parts where the design is to appear. Place the cover in the blocking-press up to the gauges and pull the lever or handle the full way and back again sharply, if the press is a little too hot, especially in cloth work, as the glue is apt to melt and come through the cover. It may be necessary to rest awhile with the pressure on the cover in the case of leather work; take the cover out and rub off the surplus gold with the gold rag and clean with rubber. If you proceed in this manner, and get plenty of blocking to do, you will soon become an efficient blocker. Experience is the teacher in these matters.—G. C.

**Bicycle Repairs.**—A. W.—A. W. does not state whether he means new tires on new wheels or simply repairing tires of old or used wheels. To put a new tire on a new rim, clean the hollow of rim with a cloth dipped in paraffin; dissolve the cement in an iron ladle over the fire; when it is liquid enough to run like syrup, pour it evenly all round the rim, having first heated the rim by turning it round slowly over a fire. When the rim is fairly warm all round, and the cement poured on, go rapidly round it with a hot poker; then place the rubber tire on all round, as rapidly as possible, taking care not to twist it: that is, keep the same side of the rubber up all round. If the rim and cement have been sufficiently hot, the rubber will hold by simply pressing it into the hollow with the hands and rolling it sideways. If the cement does not ooze out at the edges, then the under side of the rim must be heated over a gas or lamp flame. When you feel the rubber rolling smoothly, and see the cement oozing at the edges, then the rubber will hold. The superfluous cement is cleaned off after it has hardened. To put on an old tire that has come wholly or partly off, go round the exposed hollow rim with the red hot poker, pour new cement on the places that are thin and bare, place the rubber in position, press it with the hands, and operate with the gas flame as above, if necessary. Cement, 1s. per lb., of W. A. Lloyd, Waeman Street, Birmingham.—A. S. P.

**Veneers.**—P. C. (*Bedfordshire*).—You can get all kinds of veneers in every thickness at either of the following firms:—J. Latham, 124 and 125, Curtain Road, E.C.; A. H. Farmer, 49, Austin Street, Shoreditch; or L. Marshall, 14, James Street, Old Street, E.C.—A. J. H.

**Dulcimer Dimensions.**—ANXIOUS (*Norwich*).—If ANXIOUS will control his anxiety a short time longer—that is, until he reads this—he will acquire all the information he seeks, as the papers which appeared in the first volume of WORK on "The Dulcimer" answer the whole of his questions fully and explicitly. In constructing his instrument he evidently made the mistake of supposing that a simple hollow box would answer the purpose, and so neglected to provide it with "braces," "lining-blocks," and "inside bridges." If such was the case, it is no wonder that his "back" gave, and his "belly" became hollow. It is not improbable that he has altogether missed the first paper that has appeared on the subject. With regard to the Xylophone, the *best* wood for the purpose is rosewood, but very good instruments may be made from yellow pine. They can be made, in fact, from almost any wood that is free from knots: the more dense kinds giving, as a rule, the best results.—R. F.

**Bamboo Canes.**—J. D. (*Edinburgh*).—Apply to Mr. F. Westbury, Great Dover Street, Boro', London, S.E.—I daresay he would make you up an assorted bundle of bamboos for 10s. If not you cannot do better than get them from some good local cabinet maker who sells bamboo fancy furniture.—D. D.

**Converting Blinds.**—A. L. B. (*Stoke Newington*).—You will experience no difficulty in removing the wire gauge from the frames. These may afterwards be filled with stained glass. But as this is comparatively costly one or other of the substitutes may suit you better. If so I can recommend "Glacier," which is an excellent imitation, inexpensive, and easily applied. I daresay you know it can be got at Perry's, Holborn Viaduct.—D. A.

**Articles in WORK.**—T. W. (*Pateley Bridge*).—Sketching in water colours cannot at present be taken up in WORK. Any paper you like to send in on approval will be carefully considered, with a view to publication.

**Mail Cart.**—H. W.—I designed Fig. 6 at the suggestion of a reader of WORK. I improved upon the ordinary mail cart by making the seats to lift or fall to allow the riders to stand up when tired of sitting. In the design the footboards look stronger than the cross-bars, which in reality should be *vice-versâ*, the cross-bar being 1 inch square of ash or oak, and the footboards ½ inch thick. After I had designed Fig. 6, the idea occurred to me to improve the mail cart further by fixing a box underneath the seat, having a hinged lid in the centre of the seat to place small purchases, etc., in the box. The box must not touch the axle, or the springs would not be of any use to save the cart from jolting. This idea is happily carried out in Fig. 8. As these two designs were specially designed for WORK, and the improvements have not been patented, I think you need not be afraid of infringing upon them. Of Fig. 3 I, however, cannot speak, it being illustrated

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and showing the general way of making them, and as being the principle upon which all the others are made.—W. P.

**Iridescent Silver Leaf.**—J. H. (*Birmingham*).—Iridescent or "Peacock" silver is of German manufacture, and owes its colour (as we imagine) to exposing the leaf to the fumes of some weak acid made warm. If, as we conclude from one of his other queries, J. H. is a printer and requires the leaf for printing purposes, we may tell him that its appearance on small type scarcely repays the trouble of using it; but that on large type, and especially by artificial light, its effect is exceedingly good. The leaves are to be procured at 12s. per 1,000 from Mr. W. Hofer, 37, Upper Thames Street, London, E.C.—S. W.

**Preserving Skeletons.**—SKELETON (*London, W.C.*).—We would suggest a careful cleaning of the bones with, say, an old tooth brush, and a strong solution of potash or soda. If they are not then of a good colour, they can be further bleached by exposure to sun, air, and dew, or more quickly chloride of lime. For articulating (that is uniting the joints) wire is best, and in any case the vertebræ will have to be threaded on wire and the skeleton generally supported by it. In the case of small bones, or where the surface of contact is broad, a strong cement (such as isinglass and acetic acid) will serve, but this will scarcely do for the main joints of legs and wings. In small animals the natural ligaments may often be left to tie the joints, and are safe when well dried. As regards a work on taxidermy, SKELETON will probably find the directions in Dixon's "Rural Bird Life" (Longmans, 5s.) about what he requires. Waterton's system of setting up birds, etc., without wires, is printed with the better editions of his "Wanderings in South America."—M. M.

**Cheval Screen.**—S. N. (*Dalston, E.*).—The dimensions of the cheval screen were not given exactly on purpose that every one who wished to construct it should modify it accordingly. If you take the height of the desk flap at that of an ordinary writing-table, the other proportions matter little. The uprights and shelves should not, I think, be over 5½ inches wide. The thickness depends so much on the texture of the wood used. What would be absurdly clumsy in rosewood would be, perhaps, insufficient in ordinary deal. Wood ¾ inch thick was in view when the designs were prepared, mahogany being quite staple in that thickness.—J. G. W.

**Clock-Case Carving.**—(*Hexham*).—Had you given the rough dimensions of desired clock case, I would have tried to add a sketch with this; as, however, you do not say if it is a bracket, a grandfather's, a miniature, or a Dutch clock you would like to set in carved wood, I fear you must wait until a paper in hand on carved clock cases finds space to appear.—E. B. S.

**Monochrome Paper.**—H. C. (*Bethnal Green*).—The bookbinder's end-paper you enclose is the right material, but totally unsuitable in design. If my memory serves me, Messrs. Johnston are the makers of very pretty patterns printed in soft greens, greys, cinnamons, and fawns, that look excellently well. Probably no stationer would keep these, but at the larger binding factories you could probably obtain a few sheets. The cost is not great, but the makers, I expect, sell them only in quires of twenty-four sheets of one colour and design. There are soft colour patterns in printed cottons and muslins hardly more costly that might be used, but these would necessarily increase the trouble of manufacture.—E. B. S.

**Rivet Holes in Chair.**—J. H. (*Manchester*).—If you cannot manage to find the positions of the rivet holes from a study of the drawing, in which they are shown pretty clearly, you should take a few thin slips of wood, cut to the same width as the framing of the chair, and experiment with them, fastening them with screws to represent the rivets. By doing this you will be able to shift the positions of the screws until the proper place is found; you can then put the rivets in the chair to correspond with the screw holes. Of course you must not expect that the chair when finished will fold perfectly flat; few folding chairs do, but it will fold into a much smaller compass than when in use, and so can be the more readily stowed away, when not required.—G. LE B.

**Vegetable Ivory.**—J. S. (*Staleybridge*).—It is not worth your while attempting to make a substitute for ivory for turning. The natural substance known as vegetable ivory is only suitable for small things, and not sufficiently good for much work being spent on it. Xylonite is pleasant to work in and inexpensive, but cannot be got in pieces over 1 inch thick. The address of the makers has already been given in these pages.—D. A.

**Metal Watch Cases.**—S. S.—I am sorry to say I cannot give any information on this subject. I believe some are made in Birmingham; probably any readers there might help.—J. T. V.

**Studio Camera.**—H. W. (*Gateshead*).—A description of such a camera may appear after a time, but not just at present.—E. D.

**Polishing Table Top.**—E. C. (*Reading*).—Certainly. To polish your pitch pine table top, use ordinary white French polish. This can be bought, or you may make it yourself, by dissolving bleached shellac in methylated spirits. The proportions used vary considerably, but if you take 6 oz. shellac to each pint of spirit you will do very well. Of course the more shellac the thicker the liquid will be, and *vice versâ*. Before applying the polish you should fill in, that is to say, stop up the grain of the wood with some filling, of which one of the best is some whiting mixed with oil and polish. The oil should be raw linseed, and should be slightly in excess of the polish. The filling is best when of a fair working consistency, not soft enough to flow, but softer than putty. Rub this well into the wood, and then clean off the surplus before it becomes hard. You must then body up, and afterwards spirit off in the usual way. If you are conversant with ordinary French polishing on dark wood, you will observe I have given you no directions for oiling your pitch pine top, and in case you may think this is an oversight, I may add that oiling should be, or rather may, with advantage, be omitted. Oil will darken the wood unpleasantly, and in a short time cause it to assume a dirty appearance. The stopping you have used to fill up defects in the wood is not a good one. Instead of beeswax alone a mixture of it and resin is preferable for obvious reasons.—D. A.

**Frame Gilding and Varnishing.**—A. R. (*Rochdale*).—Your friend is quite right in telling you that the gold bronzing will blacken. There are two ways of using these bronzes: one is to go over the article with varnish or Japanese gold size, and then, just before it gets hard, to dust or rub on the powder with a piece of soft wash-leather. The other way is to mix it in solution with shellac and methylated spirits, or other similar articles, and apply with a brush. It is not often used with gold size, as you did it, since it must lose a large amount of brightness in mixing with this liquid. Some bronzes last longer than others, but it is difficult to judge them when buying as to this quality; they all discolour in time, however. The sample sent is a bright gold colour, and is, so far, of good quality. If you consider it worth while, the bronze can be preserved by a very thin coat of white-hard spirit varnish, or a little white shellac dissolved in "methylated" will answer. This is the only varnish suitable: oil varnish would give the bronze a very coarse and common appearance.—F. P.

**Plating Figures.**—BRASSOLINE (*Glasgow*).—I expect from our querist's query he means the lacquer that is sometimes applied to these figures. But he can also obtain that dark red colour by means of working a cyanide copper solution with a silver anode, or he can do it also by means of the artificial colouring mixture. A suitable lacquer to use is, dissolve in ½ pint of methylated spirit 4 oz. of clear seedlac and ½ oz. of dragon's blood. These should be well pulverised together before being added to the spirit; this should be done in a glass bottle. The bottle should then be placed in some warm water and gradually boiled; but be careful and see that the spirit does not also boil into the fire, on account of its being so inflammable. *Colouring Mixture.*—Mix a powder well in a mortar: sal-ammonia, 1 oz; copper acetate, ½ oz.; saltpetre, ½ oz.; sulphate of soda (Glauber's salts), ½ oz. When well mixed and wanted to be used, mix it into a paste with a little water, and cover the article with it; gently heat the article till it turns of a greyish colour, then allow to cool, and wash the mass off with warm water and polish with rouge. This is the method I use, and always with great success, and I believe it is the method generally used in Clerkenwell for similar work. If you do not manage to get on with these receipts write me again, stating your difficulty, when I will try and help you.—F. W. M.

**Aquarium Dish.**—G. T. A. (*Stockton-on-Tees*).—The glass for aquarium can be obtained through any china and glass dealer. Should you have any difficulty, however, buy a cheap epergne with an escalloped dish (that is what I did), and knock off the lower part; you then have a dish with a central hole, price about 1s. The jet is an ordinary "oil can nozzle" (trade term); order from any tool shop. For getting a good effect you must fix this true, so that the column of water falls equally all round, and gives that pretty spray which is absent in a badly-fitted jet.—C. M. W.

**Printers' Varnish.**—J. A. G. (*West Rainton*).—We should not advise J. A. G. to attempt to make printers' varnish; we assure him it is cheaper to buy than to make. So is boiled oil, to say nothing of the danger of its taking fire, unless it is very carefully watched, or done by steam-heated "jacketed" vessels. If it takes fire it is useless. Gold size, which is also used in coloured inks, is also difficult and tedious to make, and like varnish and boiled oil is much better made in large quantities by an experienced man, in point of certainty and quality, than in the small quantities within an amateur's means. Inks are cheaper to buy than to make, but J. A. G. can, if he prefers it, save the cost in cash by substituting his labour in the grinding. The writer questions very much whether he will save even that, as even with a steam-power mill, the colours for 2s. coloured inks are often ground fourteen times before they are fine enough for use. However, J. A. G. can begin by purchasing at the paint shop, or artist's colourman's, the dry colours he requires, and proceed to grind them with boiled (linseed) oil, as stiff as his strength will allow of, over and over again, until he can see no particles at all, but a very smooth silky surface as the muller leaves it. A glass muller on a marble slab, or a granite one, gives the best results. When thoroughly ground add a pinch of sugar of lead, a few drops of Japan gold size, enough L. P. varnish to let it down to the consistency required, and a little thin litho varnish, if required thinner still or to be transparent. If a tint be required it may be obtained in one of two ways, either by using flake white with the colour, till the right shade is obtained, which is a bodied colour, or by using very little colour, thinned down with litho varnish and gold size, till a very transparent shade is obtained, according to the exigencies of the job. Beware of using a steel palette knife for any aniline colours; a bone paper-knife is better, as iron and steel cause coagulation of these. Vermilion is also blackened somewhat by such contact. A nickel-plated palette knife injures no colours, and is easily cleaned. Terebine is the best cleanser of mullers, slabs, and knives.—J. W. H.

**Electric Alarum for Clock.**—SEA BOOTS (*Bermondsey*).—You will find full instructions on how to fix an electric alarum on an American clock in No. 32 of WORK, published on October 26th. Further details on how to fix the wires, and connect them to the bell, will be found in replies to ONE IN NEED (*Coventry*) and H. E. C. (*Woodford*). This correspondent wishes he had known WORK before, and says, as he is "a poor man" he is unable to get the back numbers. Well, I am a poor man, but I have got a tidy little library of books, and I don't mind telling you how I got them. I do not smoke tobacco, but set aside my tobacco money for books. My bookcase, with its goodly rows of books, is a case of permanent "smokes." Go and do likewise if you want a nice little library. If you really desire intellectual pleasures, and are prevented by lack of means, give up some gratification of the animal appetite, and spend the money on intellectual pursuits. By giving up half a pint of beer a day for a month, all the back numbers of WORK could be obtained. The first four chapters on Burglar Alarums are found in Nos. 20, 27, 31, and 34.—G. E. B.

**Patent Idea.**—J. W. (*Newcastle*).—J. W. cannot patent an *idea*. What is required for patenting is a manner, method, or mode of doing something, which must be novel, useful, and not in use by the public at the time of making the application. The purpose mentioned by J. W. is no doubt an important one, and it has occupied the minds of many persons for many years past. If J. W.'s mode of carrying out the idea is simple, practical, and better than the others, and he is in the position to get it taken up by those who would require to use it, it may be worth while to patent it. This, however, must be better known to J. W. than to us, and if he is satisfied that he can turn it to account, and desires to carry it out, on his sending us further particulars we can then say what we think. Our readers should carefully remember that a mere idea is unpatentable, only an actuality—*i.e.*, the embodiment of the idea in a practical form—can be patented, and this, if properly done, and the thing is in a new field, then it gives the inventor the right to any mode of carrying out the object, and protects his rights by making improvers pay him part of their profits, as they would have to pay him for working in his field.—Z.

**Broken Mainspring.**—S. M. (*Manchester*).—You might, I think, do the mainspring all right. Take the barrel out, and send or take it to a tool shop or watchmaker's, and get a spring to suit; get him to punch a hole in the end of it, if there is not one, and see that the hook fits in nicely, then wind it in by the arbor; oil the cover of barrel, also the bottom, and give just a spot or two on the spring; if it is a horizontal with stop-work, wind up the spring and count the turns it makes—it should be about five; set it up half a turn—that is, put on the key, and wind it up half a turn, and put the finger piece on, letting the shoulder of stop work rest against the solid piece on the star wheel, then there will be power on when the stop work is all down. Now the hairspring. Take out cylinder, and send it or take it to a tool shop with the old spring on it, and get the nearest you can. You can roughly guess if it will do by holding the end of spring, and see how far the cylinder drops; then try the new one by passing the cylinder through the centre of hairspring, and hook it in the slot, and see how far it drops; if too far, take hold of the spring farther in from end—say, half a turn farther—and repeat till you get it as near as possible, to drop the same distance; then you have a guide where to pin the loose end. Now take off the old one, collet and all, take out the pin that fastens the inner end to the collet, pass the end of new one in, and replace collet on the cylinder; then the outer end must be passed through the stud as far as where you held it last when measuring the drop, and on looking either on the edge or top of balance, you will see a dot mark; bring the stud in a line with the dot and top cylinder pivot, then it will be in beat; put in cylinder, and test it for time; if losing, draw spring in through the stud farther, put it in beat, and try again, or if gaining let the spring out of the stud. I trust this will help you, but it is a rather delicate job to do for a novice.—A. B. C.

**Model Manchester Dynamo.**—J. G. (*Manchester*).—J. G. wishes to know how to wind a small model of a Manchester dynamo (pole pieces, 4¼ in. by 1⅛ in. by ¾ in.; cores, 3 in. by 1 in.; armature channel, 2⅝ in. by 1⅛ in.) so as to get the best result in lighting 10-volt incandescent lamps. Wind 2 lbs. of No. 24 silk-covered copper wire on the fields, 1 lb. on each core, and from 3 to 4 ounces of the same wire on an H girder armature. The utmost you could get from such a small machine, driven at the rate of 3,000 revolutions per minute, would be current enough to light two small 10-volt lamps. You may not get even as much current as this, for the performance of the tiny machine will depend much on

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the perfection of the winding of its coils, fitting of the various parts, and adjustment of the brushes. A little loose winding, imperfect insulation, or bad connection will spoil all.—G. E. B.

**Battery for Electric Lamp.**—A. O. P. (*Birmingham*).—The size of battery required will depend upon the voltage of the lamp to be lighted, and the candle power of light desired. You will find full information in my articles "Model Electric Lights," which will appear shortly.—G. E. B.

**Defective Alarum Battery.**—B. B. (*Halifax*).—As the battery has run down in less than six months, it proves, either that it was made up of bad material, and badly put together, or it has been overworked, probably by leakage. This may be due to defective switch, defective insulation in the alarum system on the clock, or bare wire touching the staples and these driven into damp wood, or thickly painted wood. When a battery is thus exposed to leakage, the zincs soon blacken, the porous cells get coated with nodules of salt, and a strong odour of ammonia is given off from the cells, whilst the battery soon runs down.—G. E. B.

**Dining-room Couch.**—W. (*Huddersfield*).—Unless you are acquainted with "frame" making and upholstery, which I may assume you are not, it would be impossible within the limited space of "Shop" to give such directions as would be of use to you. To describe the frame or wooden part of the couch at all adequately, would occupy two or three pages, and the upholstery as many more. The subject, however, is noted for treatment on some future occasion.—D. A.

**Rocking Boat for Children.**—W. H. (*St. Leonards-on-Sea*).—I fear it will be impossible to give a detailed description of this for some time, meanwhile the following suggestions may be of use to you. A couple of pine rockers of exactly the same size and shape. Brace them in the centre with a board connecting the two. On this board place a seat for two children back to back. At each end of the rockers connect by a plank to serve also as seats. Such a boat will do for four children. If these hints are not enough let me know where your difficulty lies, and I will try and remove them either in "Shop" or, if possible, by arranging for a short illustrated article. The demands on space, however, are so great that I cannot promise this.—D. A.

**Painting Articles of Furniture.**—W. R. (*Sheffield*).—I am truly sorry for your disappointment "at not finding names of colours to finish articles in" given in WORK, but apart from the fact that everything cannot be treated of first, the subject of colouring is rather one for suggestion than for didactic treatment. The colour of articles of furniture is so much a matter of personal taste, that not knowing what yours may be, it is almost impossible to offer you that assistance which I should wish to. A great deal depends on the surrounding colour, that is to say, the colour of the walls, curtains, etc., of the room, the furniture is to be in; you do not tell me this. If I were you I certainly would not paint the articles in four colours, for the more you have the greater the difficulty in getting a harmonious result. I think you will do better by limiting the number to two. Be guided by the following general principle. Try to avoid a patchy effect, and do not let the colours be too violent in contrast. Thus, though orange and blue, green and red may be complementary colours, and form a correct harmony, they are obviously inappropriate for bedroom furniture, for in a bedroom one naturally wants quiet and restful colours, colours of low tone. For bedrooms the prevailing taste is to have the furniture, when painted, in very light colours, little more indeed than white tinted. This, however, is objectionable to some, or let me say in some rooms, for if the walls are dark, the lightly-coloured furniture is apt to be garish-looking. The endeavour should be, in a really artistic room, to have all in harmony both in colour and tone. A skilful decorator can so apply the brightest colours that they all blend in one harmonious whole, and none assert undue prominence. The effect obtained is one of richness and bloom, but to get this requires artistic perception and training. I cannot advise you yet awhile to aim at such ambitious work. If you want dark colours, try a ruddy brown and dull green, while if you prefer light, use one pinkish tint, and the other a pale blue. If you wish to further decorate you may apply a few lines or simple ornament in darker tints, just to emphasise the others. Black is useful for this when very sparingly and judiciously employed. I do not know the designs of your articles, so cannot give directions for the different parts, which must be treated according to your own discretion. Finally, after having endeavoured to show you the principles you should go on, though briefly, for the subject is almost inexhaustible, I may recommend you to paint your furniture in the two prevailing colours of the wall paper of the room the things are to be placed in. The decorative effect of the whole can then hardly fail to be pleasing. As you have a maker's colour card you can easily name those likely to suit. It might occasionally be more convenient for a few readers if colours were to be always referred to according to a particular maker's sample cards, but you must remember that there are other makers besides the one you name. It would give an undue prominence to his manufactures, and be rather unfair to others equally good, besides hampering the majority of readers in their free selection. Of course if there were any special reason for naming any particular fancy colour it would be given, but I think you will agree with me that these exceptional cases should prove the rule. I shall be glad to hear what colours you adopt, and I may be able to give you a few more hints for future guidance. It will not be a very serious matter for you to repaint all or part, and if you can send a rough sketch of the furniture, it may be of some assistance to me in advising you.—D. A.

**Silvering Glass.**—J. W. (*Muirkirk*).—This work is not suitable for an amateur, either by the pure silver or the old mercurial process. The latter, however, offers the best chance of a certain amount of success being attained, though the other is so much less costly that except as a matter of experiment or curiosity you may as well give up the idea of silvering your own mirrors. Briefly, the process is as follows:—The surface of the table must be perfectly smooth and flat. On this spread tin foil, and dab it down till all creases and wrinkles are gone. Then pour some quicksilver on it, and work it on the foil till the two are, to some extent, amalgamated. Put a little more quicksilver on, and on top of it lay a sheet of clean smooth paper. Above this place the glass, which must be quite clean and free from grease. The paper may then be drawn away to remove air, and any dirt that may be floating on the quicksilver. Let the glass remain undisturbed for several, say, twenty-four, hours, after which it should be placed on edge for the superfluous quicksilver to drain off. Be careful that the tin foil used is pure. Easy as the process may seem, it is one that requires skilful manipulation, especially when the glass is of any considerable size.—D. A.

**Drawing to Scale.**—T. J. (*Monmouth*).—(1) T. J. asks how to draw a scale, and suggests that "this may be a big question." Not at all. T. J. must first select a unit of superficial measurement, such as an inch, a foot, a yard, a rood, an acre, a square mile, or a geographical degree of the superficial area of sixty miles (geog.) long by sixty miles wide. Now drawing to scale means simply this, that on the paper this unit is to be reproduced in true proportionate size instead of its actual size. Suppose T. J. takes a foot-rule, 1 in. wide and, of course, 12 in. long, and wishes to show it on a very small piece of paper. He then has only to draw twelve equal divisions for the length, and take one thereof for width; and whether his divisions are tenths, eighths, quarters, or half inches, matters not, for the proportions are accurately represented, viz., 12 to 1. Enlarging is just the same. Take any unit, and in the drawing make every unit the same number of times bigger: the proportion will be maintained. So far, nothing can be simpler; now, then, treat every fractional part of the unit chosen precisely in the same way, so long as you keep to the same proportion and make the same number of divisions in the small scale or large scale drawing as exist in the chosen unit of the drawing you are enlarging or reducing. Things which are equal to the same thing (or, we may say, supposed to be represented—larger or smaller makes no difference on paper as equal) are equal to one another. T. J. can buy accurately-divided scales on wood or ivory, termed "Universal," where the inch is divided into every possible number of parts, which he can follow in reducing, only keeping in mind the fact that if he makes one division of his drawing represent one division of his copy, he must represent every other equal division by an equal division, and not by any different one in his drawing. That is all. (2) The adhesive material used for postage stamps is called "dextrine;" it is simply starch superheated or baked at a high temperature, and, when cold, dissolved in water like gum arabic, when it forms a mucilage largely used in the manufacturing arts. Its adhesiveness as compared with starch was discovered accidentally, after a large fire in a starch warehouse; the heat had converted the starch into dextrine—then unknown—and the water used to extinguish the flames had combined with it, forming a mucilage that does not mildew.—J. W. H.

**Wood Engraving.**—J. D. R. (*South Wales*).—The fullest treatise we know is John Jackson's "History of Wood Engraving;" it is, however, probably out of print. A superb work on the subject is by the greatest wood engraver that ever lived—W. J. Linton—and is now being largely sold; its price—necessarily high—alone limiting the sale of what will be the great standard work on the art for all future time. Order of your bookseller.—J. W. H.

### V.—BRIEF ACKNOWLEDGMENTS.

Questions have been received from the following correspondents, and answers only await space in SHOP, upon which there is great pressure:—D. M. & Co. (*Manchester*); J. W. (*Glasgow*); G. H. B. (*Smethwick*); W. W. (*Sussex*); L. & Co. (*London, W.C.*); A. B. (*Brighouse*); WATCHMAKER; BOATS (*St. Leonards-on-Sea*); A. W. S. (*Halifax*); W. M. (*Birmingham*); ABINGDON; CONSTANT READER; BOATS (*Wakefield*); R. B. (*Highbury*); A. H. O. (*Lewisham*); H. H. W. (*Pimlico*); P. F. F. (*Highbury, N.*); C. E. H. (*Rotherham*); W. D. C. (*Liverpool*); F. J. H. (*Salford*); J. R. (*Hillsboro'*); C. S. (*Aldershot*); Z. Z. Z.; J. T. (*Newport*); FOCUS; P. A. (*Glasgow*); MAGNET; BROMIDE; G. G. T. (*Edinburgh*); S. F. W. (*Edinburgh*); PAINTER; S. C. & SON (*Salop*); ROUGH CARPENTER; T. J. (*Dowlais*); W. W. (*Elswick*); TECHNICAL; W. H. (*Hinckley*); AN IMPROVER; A. G. (*Burton-on-Trent*); J. H. M. (*Ashfield*); W. C. (*Glasgow*); S. J. A. (*Hampstead*); FRITZ (*Upper Holloway*); J. O. M. (*Woolwich*); C. D. (*Camberwell*); T. B. (*Plymouth*); W. E. B. (*Rotherham*); A. B. (*Bradford*); H. W. L. (*Ealing*); H. J. T. S. (*Guernsey*); J. S. (*London, N.*); DIXA (*Aberdeen*); R. C. (*Ashton-under-Lyne*); J. M. B. (*London, W.*); SLACK; R. J. (*Scarboro'*); H. E. (*Clapham*); J. M. (*Glasgow*); W. E. (*Heckmondwike*); R. F. (*Walsall*); G. P. (*Islington, N.*); W. B. (*York*); TO PO; S. L. A. (*Hampstead*).

## Trade Notes and Memoranda.

AMONG the lectures to be given in the 136th session of the Society of Arts are the following:—One by Mr. George Findlay, the general manager of the London and North-Western Railway, upon "Modern Improvements in Facilities for Railway Travelling;" another by Sir Douglas Galton upon "M. Girard's Sliding Railway," with which Mr. Gladstone was so much struck when recently visiting Paris; and a third by Mr. Frederick C. Danvers upon "The Records of the India Office." Five courses of "Cantor Lectures" will be delivered, these being upon "Modern Developments of Breadmaking;" "The Electro magnet;" "Stereotyping;" "Some Considerations Concerning Colour and Colouring," and "Sugar, Tea, Coffee, and Cocoa: their Origin, Preparation, and Uses."

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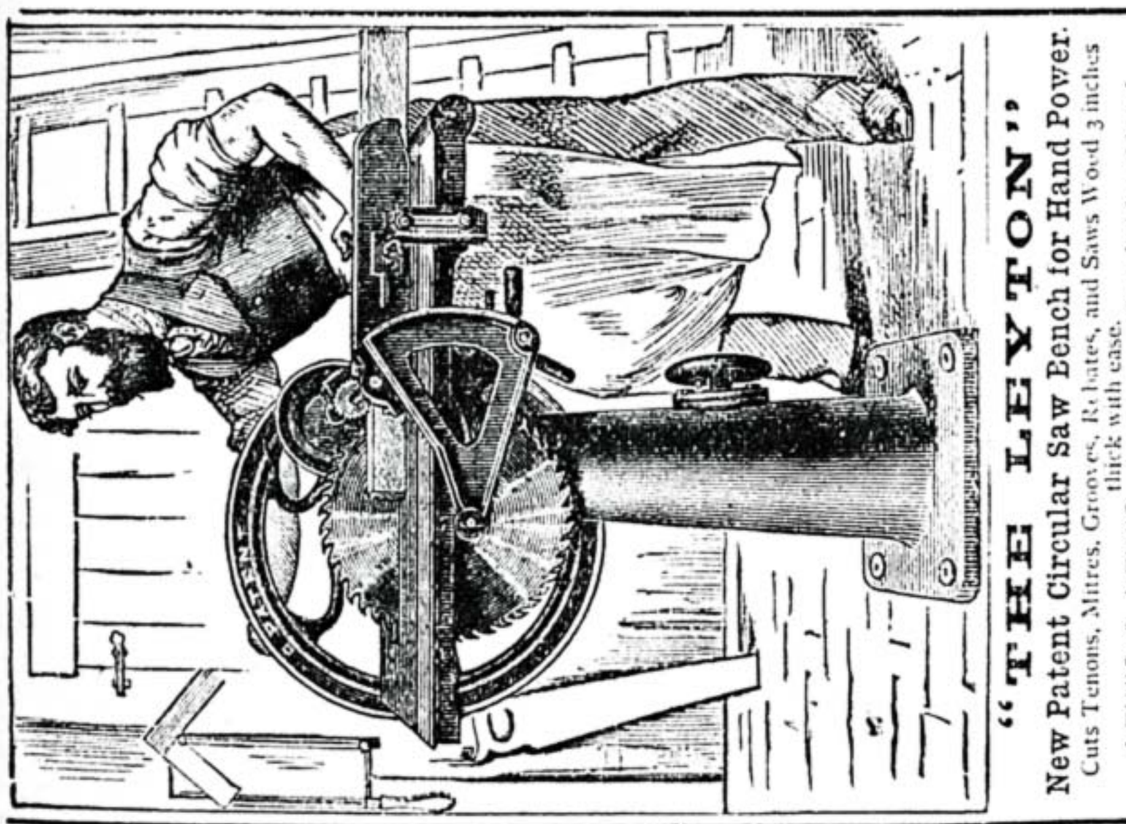

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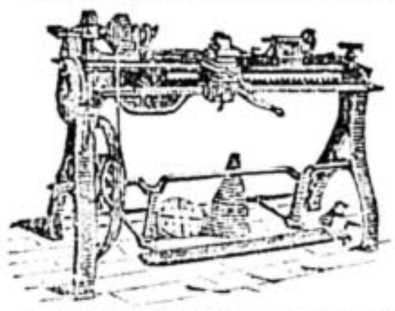

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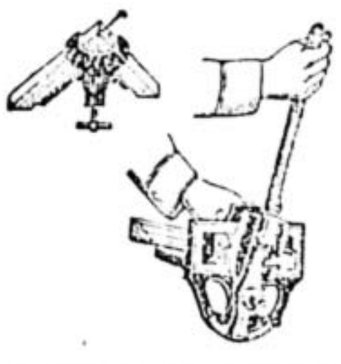

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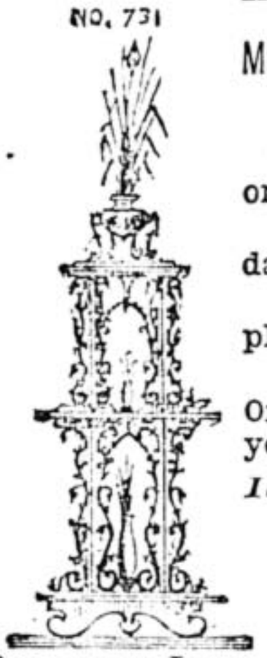

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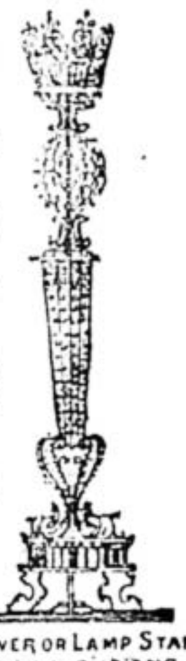

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